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THE PREVALENCE OF CHRONIC PAIN IN THE GENERAL POPULATION

BY

EDWIN MITCHELL BIRSE ©

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF NURSING

FACULTY OF NURSING

EDMONTON, ALBERTA

FALL, 1994

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled The Prevalence of Chronic Pain in the General Population submitted by Edwin Mitchell Birse in partial fulfillment of the requirements for the degree of Master of Nursing.

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Dr. J. Lander, Supervisor

Laura Olson

Dr. K. Olson

Dr. P. Hessel

June 27/94

ABSTRACT

Despite increases in knowledge about the mechanisms of pain and its treatment, chronic pain remains an enigma. One gap in knowledge is the lack of comprehensive epidemiologic data about chronic pain. The purposes of this study were to determine: (1) prevalence rate, sites and characteristics of chronic pain, (2) consequences of chronic pain on work, activity, and daily living, and (3) medication and health care utilization. Chronic pain was defined as pain of 6-months duration or longer. A cross-sectional sample of 410 adults was obtained through random-digit telephone dialling and a telephone survey was conducted. As 182 of 410 respondents had experienced chronic pain, the prevalence rate for chronic pain was 44.3%. Respondents identified the most common sites of pain as the back, head and neck. Chronic pain could be typified as intense at its worst, occurring at frequent intervals and having affected respondents for many years. Those with severe pain were characterized by high pain disability, making visits to an emergency department for pain and reporting their general health as poor. Chronic pain was determined to have a significant impact on employment by reducing employability and attendance at work. An average of 18 days of work or usual activities were lost by each person with chronic pain over six months. Most respondents with chronic pain had seen at least one physician for the pain and most took pain medications. These findings were discussed in terms of cost to society and the individual. It was concluded that chronic pain presents an enormous, but largely hidden, cost to society. Recommendations were made that longitudinal research be undertaken to examine the course of chronic pain and its precise costs. Other recommendations related to improvement of services in this geographic region.

ACKNOWLEDGMENTS

I would like to thank Dr. Janice Lander for her guidance, expertise and above all, patience, in the development and successful completion of this study. I would like to also thank Dr. Karin Olson and Dr. Pat Hessel for their advice and insight in the area of epidemiology and survey methodology, and their assistance with this project. My appreciation is expressed to Dr. Phyllis Giovannetti for her continuing support and encouragement throughout the completion of this project.

I would also like to thank John, Maria and Sophia for their support and friendship during the completion of my graduate education. A special thanks goes to my family for their words of encouragement.

This study was supported by a grant from the Alberta Foundation for Nursing Research.

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PREVALENCE OF CHRONIC PAIN IN THE GENERAL POPULATION

Edwin M. Birse

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Unrelieved pain has a pervasive negative effect on sufferer, family, caregivers and society in general. Unlike acute pain, chronic pain is without biological value for it does not serve as an alarm for impending tissue damage. Chronic pain is merely physically and psychologically destructive (Bonica, 1990). Despite increases in knowledge about the mechanisms of pain and its treatment, chronic pain remains an enigma (Baszanger, 1989; Burckhardt, 1990; McCaffery & Beebe, 1989).

During the past decade, a number of researchers have investigated the extent and significance of chronic pain in the general population (Andersen & Worm-Pedersen, 1987; Brattberg, Thorslund, & Wikman, 1989; James, Large, Bushnell, & Wells, 1991) as well as among enrolees in family practice clinics and health maintenance organizations (Crook, Rideout, & Browne, 1984; Von Korff, Dworkin, Le Resche, & Kruger, 1988). Despite these efforts, there remains a need for comprehensive epidemiologic data about chronic pain in the general population. The following are required: a description of the natural history of chronic pain; identification of those at risk for developing chronic pain; identification of prevalence rates; and evaluation of methods for preventing disability. The objectives of the study recorded in this paper were to describe the prevalence of chronic pain in the general population and the impact of chronic pain as perceived by the individual.

Literature Review

This literature review is divided into three sections. Presented first are issues around the definition of chronic pain, followed by a review of current information on the prevalence of chronic pain. The final section addresses the issues of disability and utilization of health care by individuals with chronic pain.

Defining Chronic Pain

Pain has been defined broadly as an "unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Merskey, 1986). Central to this definition is an image of pain as a

unitary subjective experience, which leads to an emphasis on self-report as a source of information.

Pain is generally classified as acute, chronic-malignant or chronic-nonmalignant. Chronic-nonmalignant pain originates from non-cancerous disorders whereas chronic-malignant pain arises from cancer. Chronic and acute pain are typically differentiated by overall duration of the pain experience. Post-incisional pain and needle-stick pain are examples of acute pain as they are short-term. Arthritic pain and recurrent migraines are examples of chronic nonmalignant pain.

Practitioners and researchers have not achieved consensus regarding the particulars of defining and classifying chronic pain (Von Korff, Dworkin, & Le Resche, 1990). Melzack (1986) defined chronic pain as "pain that may begin as acute pain but which continues long after the injury has healed or the insult has been removed". The International Association for the Study of Pain considers chronic pain as "pain that persists past the normal time of healing...we have taken 3 months as the most convenient point of division between acute and chronic pain" (Merskey, 1986). Others have suggested that the definition of chronic pain include the notion of recurrence at intervals, lasting for months or years (Bonica, 1990) or that which significantly interferes with functional abilities (Loeser & Egan, 1989). Therefore, chronic pain can be deemed to be any pain, regardless of origin, that recurs or persists over an extended period of time and interferes with functioning (Burckhardt, 1990).

There are several criticisms that can be made about the inclusion of functional disability in the definition of chronic pain. First,the matter of defining and measuring interference with functioning has been ignored. Second, interference with function is not a trait which is exclusive to chronic pain. It can also occur with acute pain. Third, it is conceivable that long-term pain could occur in the absence of interference with function. By definition, this pain could not be classified as chronic pain.

A number of other criticisms can be made about the existing definitions of chronic pain. The concept of normal healing is difficult to apply to many diseases associated with chronic pain where the condition degenerates over time (Von Korff et

al., 1990). Furthermore, the points of division for acute and chronic pain do not appear to be based on research evidence. Nonetheless, the time period of six months is a common division between acute and chronic pain.

Prevalence of Chronic Pain

The complaint of pain is one of the most common reasons for seeking health care (Selbst & Clark, 1990). There are, however, no accurate statistics on the prevalence of pain in the general population (Crook et al., 1984). Epidemiologic surveys have been carried out for particular pain complaints, including: back pain (Nagi, Riley, & Newby, 1973; Reisbord & Greenland, 1985; Spitzer, 1986); headache (Linet & Stewart, 1984; Newland, Illis, & Robins, 1978); arthritic pain (Acheson & Collart, 1975); musculoskeletal pain (Cunningham & Kelsey, 1984); and abdominal pain (Drossman, Sandler, McKee, & Lovitz, 1982; Thompson & Heaton, 1980).

The use of epidemiologic methods to study different types of pain conditions in the same set of subjects is relatively recent and has provided information on the prevalence of chronic pain among adults in Canada, the United States, New Zealand, Denmark and Sweden. An annotated bibliography of studies on prevalence of chronic pain is presented in Appendix A.

Prevalence rates for chronic or persistent pain vary, ranging from a low of 5% to a high of 40%. Irregularities in chronic pain prevalence rates may stem from: (1) definitions of chronic or persistent pain; (2) characteristics of the populations studied; and (3) sampling methods employed in the research.

Definitions of Chronic Pain. Chronic pain has been defined in terms of interval of occurrence and frequency. Pain has been defined as the occurrence of pain during a two week interval prior to a survey and being often troubled by pain. Andersen and Worm-Pedersen (1987) obtained a prevalence rate of 38% while Crook et al. (1984) found the prevalence rate to be 11%. While the populations sampled were different, the definitions of chronic pain were the same. These studies may have underestimated chronic pain prevalence by excluding those with recurrent or episodic pain who were pain-free in the specified interval.

In other research, chronic pain has been defined in terms of duration of pain, usually three or six months (Brattberg et al., 1989; Taylor & Curran, 1985; Von Korff et al., 1988). Chronic pain prevalence rates as determined in these studies have ranged from 5% to 40%.

Characteristics of Study Populations. It is also important to examine the characteristics of the samples when comparing prevalence rates for chronic pain. Respondents in some prevalence studies were younger than those in others (James et al., 1991; Von Korff et al., 1988 versus Andersen & Worm-Pedersen, 1987; Crook et al., 1984; Taylor & Curran, 1985). Taylor and Curran (1985) for example, reported that 14% of their sample were 65 years of age or older compared to 7.6% in the study by Von Korff et al. (1988). The more youthful sample occurred because it was obtained from a Health Maintenance Organization where coverage was provided as an employee benefit. This accounted for lower numbers of retired, disabled or unemployed individuals in the sample. Their prevalence rates were 5 to 11% (Taylor & Curran, 1985) and 12 to 40% (Von Korff et al., 1988) based on the site of pain.

Sampling Methods. The approach used to obtain a sample may also contribute to variations in prevalence rates. For example, Crook et al. (1984) randomly sampled families receiving care in a family practice group but did not randomly sample the respondent from the members of the household. Moreover, sampling from those enroled in health groups or family practices (such as, Von Korff et al., 1990; Crook et al., 1984) reduces the ability to generalize to the population.

Health Care Utilization

Not all individuals seek health care for chronic pain (Banks, Beresford, Morrell, Waller, & Watkins, 1975; Brody & Kleban, 1981; Brody, Kleban, & Moles, 1983; Crook et al., 1984; Taylor & Curran, 1985; Waters & O'Connor, 1971). Taylor and Curran (1985) reported that about 12% of respondents with pain had not sought services of health care professionals. Reasons cited included that pain was not considered severe enough, help could be obtained from family and friends, health care cost too much, and health care professionals could not offer any assistance.

Although many people with pain do not seek assistance, many more do utilize the health care system and/or take medications. The reported percentage of people seeking health care or using medications for pain has ranged from 19 to 81 percent (Crook et al., 1984; Taylor & Curran, 1985; Von Korff et al., 1991). Universality of the health care system and availability of specialized services may account for different utilization rates from study to study. As well, those research design factors which contributed to variations in prevalence rates are also responsible for a wide range of utilization rates.

Little is known about the patterns of health care utilization among chronic pain patients other than that the rate of health care utilization increases in the presence of persistent pain (Crook et al., 1984; Gjorup, Hendriksen, Lund, & Stromgard, 1987). Moreover, those with chronic pain seek care from multiple sources. The number of health care professionals consulted has been shown to increase as pain intensity increases (Taylor & Curran, 1985; Sternbach, 1986).

Use of medication is positively correlated with presence of pain, intensity of pain and multiple pain sites. Severity, persistence and recency of onset of pain have been associated with recency of obtaining health care for a pain symptom (Von Korff et al., 1991).

Disability

The cost of chronic pain is staggering. The costs of disability related to chronic pain are estimated to be about $50 billion per year in the United States (Wall & Jones, 1991). It is estimated that 550 million sick days are lost annually because of chronic pain syndromes among the working population (Chaplin, 1991). Although the majority of workers return to work quickly, a small percentage are absent from work for prolonged periods of time or never return to work. These individuals account for the majority of health care costs and compensation payments (Spitzer, 1986).

Taylor and Curran (1985) found that between 5% and 75% of individuals reported that chronic pain interfered with an aspect of daily activities, including work. The rate of interference was related to the site where chronic pain was experienced.

Those with back pain, headaches and abdominal pain reported greater mean rates of interference than those with facial or chest pain (Von Korff et al., 1988). Individuals reporting the inability to carry out some activities of daily living ranged from 14% for facial pain to 48% for headaches. Pain in multiple areas or pain due to accident or injury was likely to result in disability (broadly defined as moderate to severe activity restriction, or change in job status, or $\geq$5 days lost from work) (Cunningham & Kelsey, 1984).

Crook et al. (1984) reported that the number of days kept from usual activities or number of days in bed because of pain showed no significant differences between those individuals with temporary or persistent pain. However, at least 28% of the individuals surveyed who experienced either temporary or persistent pain reported some interference in either work or usual activities.

General Health Appraisal

The rating of self-reported health status has been shown to be a strong predictor of health care use (Mechanic, 1978; Tessler & Mechanic, 1978). Those reporting pain were twice as likely to report their health status as fair or poor compared to those without pain (Von Korff et al., 1991). Moreover, individuals with pain who rated their health as fair or poor were likely to report pain intensity as severe or unbearable (Taylor & Curran, 1985).

Summary

Differences in reported prevalence rates for chronic or persistent pain can be attributed to differences in definitions of chronic pain, in characteristics of the population sampled and in sampling methods. There remain many questions about the prevalence of chronic pain and its effects on the individual and family. The answers to these questions can be determined by conducting research which uses stringent definitions of chronic pain and meticulous sampling methods.

Given the considerable increase in research on pain and the growth of interest in management of pain, changes in chronic pain prevalence might be expected to occur. Periodic assessments of prevalence rates should therefore be undertaken to update our knowledge.

Purpose of the Study

The purpose of this study is to assess the prevalence and impact of chronic pain in the general population and to determine the health care utilization patterns of these individuals. The following questions were addressed in this study:

1. What is the prevalence of chronic pain in the general population?
2. What are the common anatomical regions or sites of chronic pain?
3. How is pain evaluated in the terms of intensity, duration and frequency?
4. What are the consequences of chronic pain on activity, sleep, work and family roles?
5. What is the perceived impact of chronic pain on the individual, family, co-workers and friends?
6. What is the pattern of health care utilization in individuals with chronic pain?
7. What is the extent of prescription and non-prescription medication use by individuals with chronic pain?
8. What are the similarities and differences between individuals reporting chronic pain and those who do not report pain?

Method

Population

The population included all adult residents living in Edmonton, Canada. Based on the city census, the target population consisted of 461,855 adults. Most (98.2%) households have telephone service. Residents in this area have universal access to basic health care services, including hospitalization. The costs of some supplementary health services, however, must be borne by individuals. For example, medications, access to non-physician health providers and some cosmetic surgery are paid for by the individual. During the time of this study, physicians, medicentres and emergency departments were the options available to individuals seeking health care as there was no direct access to other health care providers.

Sample

The sample for this study consisted of male or female adults (18 years of age or older) who understood English, resided in the greater Edmonton area and could be contacted by local, direct-dial telephone. The calculation of sample size was based on previous epidemiologic surveys which have found total prevalence rates for chronic pain ranging from 11% to 40%. Based on a population of 461,855 adults in the Edmonton area, the calculated sample sizes ranged from 156 (for estimated 40% prevalence) to 384 (for 11% estimated prevalence) with a bound on the error of estimation of 0.05.[1] Over-sampling was done to assure an adequate sample size. This was set at 410.

Definitions of Pain

Definitions used in this study for categories of pain are located in Table 1. For the purpose of this study the time period selected as the point of division between acute and chronic pain was six months to allow comparison with other chronic pain prevalence studies (Von Korff et al., 1990). No distinction was made between chronic-nonmalignant and chronic-malignant pain.

Instruments

Data were collected using a questionnaire developed for the study (Appendix B). Items for this study were adapted from previous epidemiologic studies on pain (Andersen & Worm-Pedersen, 1987; Brattberg et al., 1989; Crook et al., 1984; Taylor & Curran, 1985; Von Korff et al., 1988) or newly developed for this study.

The following represent the general topics assessed in this survey:

- occurrence of pain in the past 6 months (including frequency, duration and

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[1]. This calculation is based on the equation:

$$n = \frac{Npq}{(N-1)D+pq}$$

where, N = population
n = sample size
p = population proportion
B = level of reliability
q = 1-p and $D = B^2/4$
(bound on the error of estimation (Mendenhall, Ott & Scheaffer, 1971, p.46).

Table 1
Definitions of Pain

TERM	DEFINITION
Pain	• A perception of a bodily state by an individual. • Experienced for $\geq$ 1 day during a 6 month period prior to interview. • Excludes minor aches and pains as from exercising or bruising.
No Pain	• Any experienced pain that lasted $<$1 day or was of minor nature during the 6 months prior to interview. Or pain had been non-existent during the 6 months prior to interview.
Acute Pain	• Pain duration was $\geq$1 day to $<$6 months *and* had a finite span. • It was experienced only once during the 6 months prior to interview and had not been experienced prior to that time. It was a new pain. • Its origin was a one-time problem (as examples, torn ligament, abscess, appendectomy).
Chronic Pain	• It was an old pain; the first experience or first episode of the pain occurred $\geq$ 6 months prior to the interview. • Pain was continuous over the 6 months prior to the interview or was intermittent (occurring at least once and lasting $\geq$ 1 day).

intensity);

- overall impact of pain on activities;
- pain disability;
- use of health services and medications;
- perceived health status;
- impact of pain on others; and
- demographics.

Intensity of worst pain and usual pain were assessed on 11-point scales with the anchors 0 and 10 (representing none and worst possible pain, respectively). Another item asked for the number of days in the past six months that pain prevented usual activities, including sleep. This information was requested overall, not broken down by pain sites.

The Pain Disability Index (Tait, Chibnall & Krause, 1990) is an inventory covering seven broad areas. It asks for a rating of the degree to which pain interferes with: family or home responsibilities, recreation, social activity, occupation, sexual behaviour, self-care, and life-support activity. An 11-point scale is used (0=no interference from pain; 10=complete interference from pain). The Pain Disability Index is scored by summing the ratings for each of the categories.

Two studies have shown the tool to be sensitive to differences between individuals with chronic (six months or longer) low back pain who show limited disability or considerable disability (Pollard, 1984; Tait, Pollard, Margolis, Duckro, & Krause, 1987). The Pain Disability Index has been found to be internally consistent using the method described Cronbach (alpha reliability = 0.87). Item-total correlations ranged from 0.56 to 0.85 (Tait, Pollard, Margolis, Duckro & Krause, 1987). The Pain Disability Index was modified for this study by eliminating the question on sexual behaviour as it was felt that this would result in a loss of respondents when asked as part of a phone survey, particularly as the interviewer was male. Alpha reliability was not computed for this modification in the questionnaire.

A parallel questionnaire about health care utilization, sleep disturbances, medication use, perceived health status, and demographics was developed for those

not experiencing pain in the past six months.

The chronic pain questionnaires were pretested on 30 randomly selected individuals in the population (selected by random digit dialling). This pilot study was used to test the clarity and sequence of the questions. The revisions were minor, on the whole, except for the final question of the Pain Disability Index about life-support activity. This item was deleted as participants of the pilot study could not understand it.

Procedure

The design of this study was a cross-sectional survey using telephone interviewing. A probability sample of households with telephones was obtained through random digit dialling.

The time period for data collection was November 1991 to February 1992. The mean time for a interview with an individual experiencing pain was 22 minutes and 7 minutes for those individuals not reporting pain.

The details of the random digit dialling method follow. Telephone numbers consist of a 3-digit prefix followed by a 4-digit suffix. There are approximately 24 prefixes assigned to the City of Edmonton. Specific prefixes have been assigned to government offices and the University and so it is possible to exclude them when a telephone survey of householders is to be conducted.

Suffixes can range from 0000 to 9999, providing up to 10,000 phone numbers per prefix. Not all possible suffixes associated with a prefix have been assigned. For example, only the first 5,000 may have been assigned for a particular prefix. Unassigned suffixes have been identified by the Population Research Laboratory and excluded from their inventory of phone numbers.

All suitable prefixes have been paired with all possible combinations of the first two digit suffixes, excluding those which have not been assigned. These numbers have been entered into a computer by the Population Research Laboratory. Thus, if all 24 prefixes are utilized and all suffixes assigned by the telephone company for every prefix, then the telephone inventory would consist of 240,000, 5-digit numbers.

These numbers were randomly sampled for this study and paired with a 2-digit

random number between 00 and 99. This method provided a list of 7-digit telephone numbers which eliminated duplicate numbers, non-existent numbers, many businesses and ensured that unpublished numbers were included in the probability sample.

A list of 1,999 random telephone numbers with Edmonton area exchanges was thus obtained from the Population Research Laboratory at the University of Alberta. Telephone numbers on the list were called in sequence.

Randomization of adults within households was achieved by a probability technique that was based on the premise that assignment of birth date is a random process (Salmon & Nichols, 1983). The interviewer requested to speak to the individual, 18 years and older, who had the most recent birthday. If that individual was not present to answer the telephone, an appointment was made to return the call and speak to him/her.

The respondent selected from a household was provided with an introductory statement outlining the purpose of the study and information about confidentiality. If consent was obtained, the interview was conducted without delay.

If a telephone call was not answered, contact was attempted at varying times of the day and week to a maximum of five call-backs. Individuals who consented to the interview but found the time inconvenient were scheduled at a later, mutually convenient time. If an individual declined to be interviewed, randomization continued within the household until a consenting adult was interviewed or a refusal was made.

The first question asked of respondents was whether or not they had experienced pain for one day or more in the previous six months or pain that had recurred over the previous six months. They were asked to exclude minor aches and pains such as from exercising. They were asked if they had pain, as defined, at any of the following sites: head, neck, shoulders, arms, hands, chest, abdomen, back, hips, legs, feet or elsewhere. The no-pain questionnaire was administered to those who did not report any pain. Those who reported pain in one or more body sites were given the pain questionnaire.

Results

Preparation of Data

Data were coded from each questionnaire, directly entered from the questionnaires on to computer disk using a program which required double entry for verification. Data was consequently stored in a computer file and checked for accuracy. Descriptive statistics were obtained and the distributions of scores examined.

Response Rates

The first 1,712 telephone numbers on the list of 1,999 random numbers were dialled to obtain a sample size of 410. Therefore, 287 numbers were not dialled.

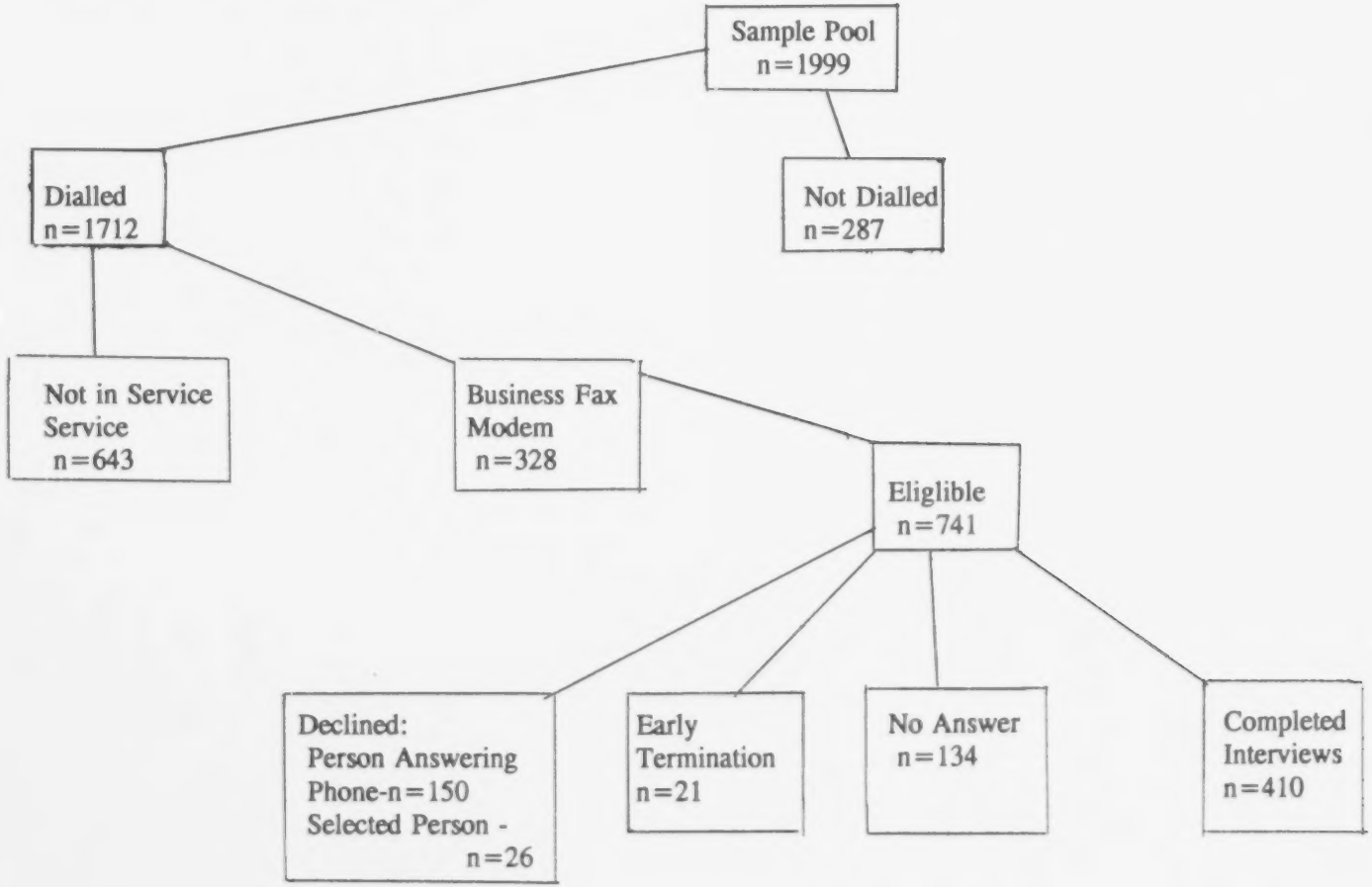
When 1,712 telephone numbers were called, 643 (37.6%) were found to be not-in-service, leaving 1,069 (62.4%) that were potentially eligible. Of the 1,069 eligible telephone numbers, 328 (30.7%) were either business, facsimile or modem lines, reducing the sample to 741. One hundred and thirty-four of the 741 (12.5%) telephone numbers were not answered after five attempted calls at various times and days of the week. This further reduced the potential number of respondents to 607.

Considering the 607 numbers where contact was made, 150 (24.7%) people who answered the phone and an additional 26 (4.2%) randomly selected members of the household declined to participate. Of the 21 (3.5%) respondents who initially agreed to participate, 15 were unable to complete the interview due to language barriers or speech difficulties and six terminated the interview or were terminated by the interviewer because they were unwilling to answer the questions. Therefore, 410 interviews were completed. Response and non-response patterns are illustrated in Figure 1.

The gross completion rate for this study was 23.9% (410 completions to 1,712 telephone numbers). A more reasonable but still quite conservative estimate of response rate is the ratio of completed interviews to potential residential numbers (410:741). This yields a response rate of 55.3%.

An even more reasonable completion rate, however, is one that eliminates all ineligible telephone numbers (all of those mentioned plus 134 telephone numbers

Figure 1
Response and Non-response Patterns



which went unanswered). Using this mode of calculation, 69.3% were successfully interviewed.

Characteristics of the Sample

Table 2 presents the characteristics of respondents (age, gender, marital status, employment status, educational level and household income). Mean age was 40.8 years (SD 16.3). More than half of the respondents were female (n=251, 61.2%). About half of the respondents were married or living common-law (n=220, 53.7%). Many worked full-time or part-time (n=251, 61.2%).

It should be noted that 159 of the 410 respondents (38.8%) either did not know or declined to provide their household income. Almost 30% (n=121) of those who answered the question reported an annual household gross income of less than $30,000.

The characteristics of the study population (City of Edmonton, 1991) are presented in Table 2. The sample resembled the population in terms of age, marital status and employment. There were, however, a higher percentage of females in this sample than were present in the city.

Pain Group Classification

Of the 410 individuals surveyed, 193 (47.1%) stated that they had not experienced an episode of pain which met the study criterion (pain lasting one day or more in the preceding six months or pain that had occurred more than once in the preceding six months and not considered to be of a minor nature). They were therefore classified as the No-Pain group.

Respondents could report pain at one or more sites which could be classified as only acute, only chronic, or mixed acute and chronic. Those with chronic pain only or mixed acute and chronic pain were combined and referred to as the chronic pain group since they experienced chronic pain for at least one site.

Twelve (2.9%) individuals had experienced an episode of pain at one or more sites that began and subsided within the six month period prior to the interview but was not an episodic or recurrent pain. These individuals were classified in the Acute-Pain group. One hundred eighty-two (44.4%) experienced pain of six months duration

Table 2
Frequencies of Characteristics for Sample and Population

Characteristic	Sample		Population[1]	
Gender (%)[3]				
Males	159	(38.8)	226,681	(49.1)
Females	251	(61.2)	235,174	(50.9)
Marital Status (%)				
Single	129	(31.5)	132,768	(24.4)
Married	220	(53.7)	257,697	(57.8)
Divorced/Separated	43	(10.5)	46,259	(10.2)
Widowed	17	(4.1)	25,075	(7.7)
Missing	1	(0.2)	0	
Educational Level (%)				
Up to High School	71	(17.3)	not available	
High School Completed	135	(32.9)		
College/Trade	109	(26.6)		
University	90	(22.0)		
Missing	5	(1.2)		
Income in Dollars (%)				
< 6,000	5	(1.2)	Median Income[2]	
6,000-17,999	42	(10.2)	41,321	
18,000-29,999	74	(18.0)		
30,000-44,999	69	(16.8)		
45,000-56,999	32	(7.8)		
≥57,000	29	(7.1)		
Missing	159	(38.8)		
Age in Years (%)				
18-29	104	(25.4)	138,623	(30.0)
30-45	183	(44.6)	167,869	(36.3)
46-59	46	(11.2)	75,920	(16.4)
≥60	71	(17.3)	79,443	(17.2)
Missing	6	(1.5)		

[1]Source except where noted: City of Edmonton, 1991.

[2]Source: Statistics Canada, 1993.

[3]In all tables, numbers in parentheses will be percentages or standard deviations as denoted beside variable or label.

or longer, occurring at one or more sites (Table 3). These individuals were classified in the Chronic-Pain group. Twenty-two (5.4%) others were considered to have long term pain which could not be classified as chronic pain as they had not experienced pain for six months or longer. Their pain also did not have a finite interval and could not be classified as acute pain. They were, therefore, placed in the Unclassified-Pain group. One individual (0.2%) identified two sites of pain, one of which was acute and the other was less than six months in duration. This individual was placed in the Unclassified-Pain group. The frequencies of subjects in the pain and no-pain groups are described in Table 3.

Analysis of Chronic, Unclassified and Acute Pain Group Data

The No-Pain group was compared with the Pain group (acute, unclassified and chronic combined). The characteristics of the pain groups are presented in Table 4. No significant differences were found with chi-square analysis for gender, marital status and education level. Age was also not significantly different (analysis of variance). There was no significant difference in income for the No-Pain and Pain groups, among the individuals who reported annual earnings (n=251, 61.2%). When the subjects were grouped by income responders and non-responders and the frequencies compared for the No Pain and Pain groups, a significant chi-square was obtained (Table 5: Chi-square=9.5, df=1, p=.002). Those who experienced pain were more likely than expected to report their income than those who were not experiencing pain.

Significant differences were found when the No-Pain group and the Pain group were compared on perceived health. Those in the Pain group were more likely to evaluate their general health as poor whereas those in the No-Pain group were more likely than expected to report their health as better than their peers. For example, 1% of those in the No-Pain group reported their health as being worse than their age-mates as opposed to 24.8% of those in the Pain group (Table 6: Chi-square=57.7, df=4, $p<.0001$).

Employment status was also significantly different for the Pain and No-Pain groups. Individuals reporting an absence of pain were more likely to be working full-

Table 3
Frequencies of Subjects: Pain and No-Pain Groups

Group	Frequency (%)
No Pain	193 (47.1)
Pain	
Acute	12 (2.9)
Unclassified	23 (5.6)
Chronic	182 (44.4)
Total	410 (100.0)

Table 4
Characteristics of Pain and No-Pain Groups

	Group					
Characteristic	Pain		No-Pain		All Subjects	
Gender(%)						
Male	81	(37.3)	78	(40.4)	159	(38.8)
Female	136	(62.7)	115	(59.6)	251	(61.2)
Marital Status(%)						
Single	67	(30.9)	62	(32.1)	129	(31.5)
Married	112	(51.6)	108	(56.0)	220	(53.7)
Divorced /Separated	27	(12.4)	16	(8.3)	43	(10.5)
Widowed	11	(5.1)	6	(3.1)	17	(4.1)
Missing	0		1	(0.5)	1	(0.2)
Education(%)						
Up to High School	42	(19.3)	29	(15.0)	71	(17.3)
High School	65	(30.0)	70	(36.3)	135	(32.9)
College/Trade	65	(30.0)	44	(22.8)	109	(26.6)
University	45	(20.7)	45	(23.3)	90	(22.0)
Missing	0		5	(2.6)	5	(1.2)
Age						
Mean (SD)	42.5	(17.3)	39.1	(15.1)	40.8	(16.3)
Number of Subjects	217		193		410	

Table 5
Presence or Absence of Pain By Willingness to Provide Income Information

	Willing to Provide Information		
Pain	No	Yes	Row Total (%)
Absent			
Frequency (%)	90 (46.6)	103 (53.4)	193 (100)
Expected Value	74.8	118.2	
Present			
Frequency (%)	69 (31.8)	148 (68.2)	217 (100)
Expected Value	84.2	132.8	
Total (%)	159 (38.8)	251 (61.2)	410 (100)

Chi-square=9.5, df=1, p=0.002

Table 6
Health Compared to Age-Mates: Pain and No-Pain Groups

Pain Group	Perception of Health										Row Total (%)	
	Much Better		Better		Same		Worse		Much Worse			
No-Pain												
Frequency (%)	16	(8.3)	90	(46.9)	84	(43.8)	2	(1.0)	0	(0.0)	192	(100)
Expected Value	14.2		68.1		82.8		26.0		0.9			
Pain												
Frequency (%)	14	(6.5)	54	(25.2)	91	(42.5)	53	(24.8)	2	(0.9)	214	(100)
Expected Value	15.8		75.9		92.2		29.0		1.1			
Column Total (%)	30	(7.4)	144	(35.5)	175	(43.1)	55	(13.5)	2	(0.5)	406	(100)

Chi-square = 57.7, df = 4, $p < 0.0001$

time and less likely to state they were unable to work or were unemployed than was expected. Conversely, those reporting pain were less likely to report they were working full-time and more likely to report they were unable to work or were unemployed than expected (Table 7: Chi-square=23.8, df=6, p=.001).

As the number of respondents who reported pain which fit in the Acute Pain (n=12) and Unclassified Pain (n=23) groups was small, no further analyses of data from these groups were executed.

Prevalence of Chronic Pain

The point prevalence rate is determined by dividing the number of individuals with a disease by the number of individuals at risk for the disease at a single point in time[2]. Using this formula, the point prevalence rate for chronic pain was: 182/410 = 44.3, which is 443 per 1000 with a ninety-five percent confidence interval of 41.8 and 45.4.

Common Sites of Chronic Pain

Respondents who reported a pain episode in the six months preceding the interview were asked which specific body sites were a source of pain. Respondents were given the opportunity to respond to a maximum of 14 sites of pain. In fact, the maximum reported was 11 sites. Seventy-eight percent (n=142) of respondents reported between one and three sites of pain (Table 8). A total of 456 sites were identified by 182 subjects.

The painful body sites reported most often were the back (frequency=94, 20.6%), head (frequency=68, 14.9%) and neck (frequency=56, 12.3%) (Table 9). Musculoskeletal or joint problems were the most common physician stated reasons for pain for those individuals who had sought medical care (all sites combined: frequency=152, 55.8%). When asked for their own explanations for their pain, respondents named musculoskeletal or joint problems most often (frequency=158, 57.9%). For those respondents who had not sought medical care, the perceived causes

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[2] Prevalence= Number of people with disease X 1000/Number at risk
(Fletcher, Fletcher & Wagner, 1988)

Table 7
Employment Status: Pain and No-Pain Groups

	Employment Status																			
Group	Full-time		Part-time		School		Unemployed		Retired		Homemaker		Unable to Work		Row Total (%)	
Pain																
Frequency (%)	102	(47.2)	29	(13.4)	8	(3.7)	16	(7.4)	31	(14.4)	12	(5.6)	18	(8.3)	216	(100)
Expected Value	112.5		26.0		10.6		11.7		28.7		16.5		10.1			
No-Pain																
Frequency (%)	110	(57.6)	20	(10.5)	12	(6.3)	6	(3.1)	23	(12.0)	19	(9.9)	1	(0.5)	191	(100)
Expected Value	99.5		23.0		9.4		10.3		25.3		14.5		8.9			
Column Total (%)	212	(52.1)	49	(12.0)	20	(5.0)	22	(5.4)	54	(13.3)	31	(7.6)	19	(4.7)	407	(100)

Chi-square = 23.8, df = 6, p = 0.001

Table 8
Frequencies of Reported Total Painful Sites

Number Painful Sites Reported	Frequency (%)	
1	73	(40.1)
2	38	(20.9)
3	31	(17.0)
4	15	(8.2)
5	8	(4.4)
6	11	(6.0)
7	3	(1.6)
8	2	(1.1)
9	0	
10	0	
11	1	(0.5)
Total	182	(100.0)

Table 9
Frequencies of Painful Sites

Site	Frequency (%)		Subjects Reporting (%)
Back	94	(20.6)	(51.6)
Head	68	(14.9)	(37.4)
Neck	56	(12.3)	(30.8)
Shoulder	40	(8.8)	(22.0)
Abdomen	33	(7.2)	(18.1)
Leg	26	(5.7)	(14.3)
Foot	25	(5.5)	(13.7)
Hip	24	(5.3)	(13.2)
Knee	22	(4.8)	(12.1)
Arm	20	(4.4)	(11.0)
Hand	20	(4.4)	(11.0)
Chest	19	(4.2)	(10.4)
Elbow	8	(1.8)	(4.4)
Everywhere	1	(0.2)	(0.6)
Total Sites[1]	456	(100.0)	

[1]Respondents could name a maximum of fourteen sites; therefore total sites is greater than total

of pain at all sites were again musculoskeletal or joint problems (frequency=25, 39.8%). The causes of pain are summarized in Table 10.

According to respondents, the most common antecedent to the pain for all sites combined was that it began spontaneously one day (frequency=195, 59.3%), followed by motor vehicle accidents (frequency=32, 9.7%) and work accidents (frequency=30, 9.1%). For a few respondents, pain was attributed to a medical or surgical procedure (Table 11: frequency=12, 3.6%).

Individuals who reported more than one body site of pain were asked to rank their pain sites by troublesomeness (to a maximum of three). Since not all respondents named more than one site of pain, the total who described each of the three leading sites of pain varied. The three sites and numbers of people describing pain at each site were: most troublesome (n=182), second most troublesome (n=96), third most troublesome (n=57). In many cases, the pain described at any of the three leading sites was not chronic pain (but was acute or unclassified). Only chronic pain was included in the analyses described in later sections, thus reducing the number of individuals to: most troublesome (n=165), second most troublesome (n=83), third most troublesome (n=53). However, all 182 respondents did identify chronic pain at one or more of the three leading pain sites.

Pain Intensity, Duration, Frequency and Time Since First Onset

Discussion of chronic pain intensity, duration, frequency and time since onset were assessed separately for the leading sites, as ranked by troublesomeness (most, middle and least). Only sites with chronic pain were included (301 sites total for the three leading sites). Usual pain intensity and pain at its worst were reported on an 11-point scale (0 is none and 10 is worst possible pain). The mean usual and worst chronic pain for the three leading sites are presented in Table 12. For the most troublesome site, the mean worst chronic pain was 7.9 (n=165, SD 2.0) and mean usual chronic pain was 3.2 (SD 2.2). The median worst chronic pain intensity for the most troublesome site was 8.0. For those individuals reporting chronic pain at all of the three leading sites (n=53), the mean usual and worst chronic pain at these sites was essentially the same (Table 13).

Table 10
Cause of Chronic Pain as Viewed by Physicians and Respondents

Cause[1]	Physicians		Respondents Who Sought Care		Respondents Who Did Not Seek Care	
Musculoskeletal or joint problem	152	(55.8)	158	(57.9)	25	(39.8)
Neurological problem	36	(13.2)	35	(12.8)	7	(11.2)
Gastrointestinal problem	11	(4.1)	11	(4.1)	1	(1.6)
Genitourinary problem	12	(4.4)	11	(4.1)	1	(1.6)
Cardiovascular problem	4	(1.5)	6	(2.3)	1	(1.6)
Problem with Infection	29	(10.7)	26	(9.6)	17	(27.1)
Not sure[2]	26	(9.6)	23	(8.4)	11	(17.5)
Total[2]	273	(100)	273	(100)	63	(100)

[1]Each is a label for the problems of a common origin (for example, musculoskeletal would include arthritis).

[2]Total exceeds number of respondents reporting pain because respondents could provide causes for a maximum of three sites of pain.

Table 11
Types and Frequencies of Antecedents to Pain

Antecedent	Frequency (%)		Subjects Reporting (%)
Spontaneous onset	195	(59.3)	100.0
Motor vehicle accident	32	(9.7)	17.7
Work accident	30	(9.1)	16.6
Sports injury	27	(8.2)	14.9
Medical or surgical procedure	12	(3.6)	6.6
Other accident	11	(3.3)	6.1
Work related, not accident	11	(3.3)	6.1
Home accident	9	(2.2)	5.0
Congenital	2	(0.6)	1.1
Total antecedents	329	(100)	

[1]Total responses exceed number of subjects reporting chronic pain because respondents could report antecedents for up to three sites of pain.

Table 12
Pain Intensity, Period Since Onset and Occurrence at Time of Interview for Three Leading Sites

Pain Feature	Troublesomeness of Three Leading Sites: Most		Middle		Least	
Pain Intensity						
Mean Worst (SD)	7.9	(2.0)	6.7	(2.1)	7.1	(2.2)
Mean Usual (SD)	3.2	(2.2)	2.6	(1.8)	2.6	(2.2)
Mean Years Since Onset (SD)	10.1	(10.8)	7.6	(9.7)	11.3	(11.1)
Frequency of Pain at Interview (%)						
Yes	84	(50.9)	45	(54.2)	34	(64.2)
No	81	(49.1)	38	(45.8)	19	(35.8)
Number of Subjects (with chronic pain at each of leading pain sites)	165		83		53	

Table 13

Pain Intensity, Period Since Onset and Occurrence at Time of Interview for Those Reporting Troublesomeness at All of the Three Leading Sites

	Troublesomeness of Three Leading Sites		
Pain Feature	Most	Second Most	Third Most
Pain Intensity			
Mean Worst (SD)	8.0 (2.0)	6.8 (2.2)	7.1 (2.2)
Mean Usual (SD)	3.2 (2.1)	2.8 (1.8)	2.6 (2.2)
Mean Years Since Onset (SD)	12.0 (14.0)	9.5 (10.9)	11.3 (11.1)
Frequency of Pain at Interview (%)			
Yes	31 (58.5)	25 (47.2)	34 (64.2)
No	22 (41.5)	28 (52.8)	19 (35.8)
Number of Subjects (with chronic pain at all of the three leading pain sites)	53	53	53

Respondents were asked when the pain first started at the three leading sites of pain. The mean time since onset was 10.2 years (SD 10.8) at the most troublesome site (Table 12). For those reporting troublesomeness at all of the three leading sites, the mean time since onset at the most troublesome site increased to 12.0 years (SD 14.0) (Table 13). Almost half of the sites (n=138, 45.8%) were a source of pain at the time of the interview (Table 14).

The durations of each pain episode are described in Table 14. For the most troublesome site, duration was greater than 24 hours for 36.4% of respondents (n=60).

Chronic pain was experienced more than 10 times per month by 95 (57.6%) of the respondents at the most troublesome site and infrequently by 13 (7.9%) respondents. Infrequent pain episodes were defined as occurring less than 1 to 2 times per month averaged over the six months preceding the interview.

The most troublesome site of pain was used for the following analyses (with only those reporting chronic pain included, n=165). The Chronic Pain group was split in two based on the median pain intensity for the most troublesome site (worst pain less than or equal to 8 and greater than 8). A discriminant function analysis was then performed to assess prediction of membership in these two groups representing levels of worst pain intensity (greater n=72; lesser n=93).

The significant prediction variables were: Pain Disability Index (PDI), emergency room visit, general health assessment, and admission to hospital due to pain. One discriminant function was defined and it accounted for significant variance between groups (Chi square=54.6, df=8, $p < 0.001$). The percentage of all cases correctly classified was equal to 72.7%. Those reporting lower pain scores (less than or equal to 8.0): had lower scores on the Pain Disability Index; had not visited an emergency department or been admitted to hospital because of pain; were younger; reported their general health as the same or better compared to others their age; and had a shorter period of time since onset of pain. They were also more likely to be male. These findings are summarized in Table 15.

Table 14
Duration and Frequency of Pain for Three Sites

Pain	Troublesomeness of Three Leading Sites					
	Most		Second Most		Third Most	
Duration in hours (%)						
< 1	16	(9.7)	10	(12.0)	5	(9.4)
1-3	17	(10.3)	9	(10.8)	11	(20.8)
4-8	4	(2.4)	5	(6.0)	3	(5.7)
9-12	16	(9.7)	10	(12.0)	9	(17.0)
13-16	5	(3.0)	3	(3.6)	1	(1.9)
17-20	3	(1.8)	2	(2.4)	1	(1.9)
21-24	24	(14.5)	13	(15.7)	7	(13.2)
> 24	60	(36.4)	23	(27.7)	10	(18.9)
Irregular (episodes lasting a few hours to a few days)	20	(12.1)	8	(9.6)	6	(11.3)
Frequency per Month (%)						
Infrequently	13	(7.9)	5	(6.0)	7	(13.2)
1-2 times	26	(15.8)	22	(26.5)	13	(24.5)
3-10 times	31	(18.8)	20	(24.1)	12	(22.6)
>10	95	(57.6)	36	(43.4)	21	(39.6)
Having Pain During Interview (%)						
No	84	(50.9)	45	(54.2)	34	(64.2)
Yes	81	(49.1)	38	(45.8)	19	(35.8)

Table 15
Prediction Variables for Median Split of Worst Pain Intensity

Predictors	Lesser Pain		Greater Pain		Correlation of Variable With Function
Mean Pain Disability (SD)	10.7	(11.4)	20.9	(14.8)	0.65
Emergency Visit For Pain (%)					
Yes	6	(6.5)	22	(30.6)	0.56
No	87	(93.5)	50	(69.4)	
Health Compared to Age-mates (%)					
Much better	6	(6.5)	3	(4.2)	0.47
Better	30	(32.3)	10	(13.9)	
Same	41	(44.1)	28	(38.9)	
Worse	15	(16.1)	31	(43.1)	
Much Worse	1	(1.1)	0		
Admitted to Hospital for Pain (%)					
Yes	2	(2.2)	12	(16.7)	0.44
No	91	(97.8)	60	(83.3)	
Early Awakening From Pain					
None	47	(50.5)	20	(27.8)	0.38
Infrequently	9	(9.7)	7	(9.7	
1-3 nights/week	23	(24.7)	25	(34.7	
4-6 nights/week	6	(6.5)	8	(11.1)	
Every night	8	(8.6)	12	(16.7)	
Mean Years Since Pain Onset (SD)	8.0	(8.1)	12.8	(13.1)	0.38

Table 15 (Continued)
Prediction Variables for Median Split of Worst Pain Intensity

Predictors	Lesser Pain		Greater Pain		Correlation of Variable With Function
Mean Health Provider Visits (SD)	1.7	(1.4)	2.6	(1.7)	0.37
Mean Days Lost From Work/ Activities (SD)	15.4	(38.9)	30.5	(55.3)	0.37
Trouble Falling to Sleep (%)					
None	32	(34.4)	18	(25.0)	0.31
Infrequently	15	(16.1)	6	(8.3)	
1-3 nights/week	27	(29.0)	26	(36.1)	
4-6 nights/week	10	(10.8)	10	(13.9)	
Every night	9	(9.7)	12	(16.7)	
Mean Age (SD)	41	(17.6)	46.6	(17.5)	0.26
Gender (%)					
Male	38	(40.9)	19	(26.4)	0.25
Female	55	(59.1)	53	(73.6)	
Mean Pain Medications Used (SD)	1.4	(1.1)	1.8	(1.1)	0.24
Guilt Due to Pain					
Yes	21	(22.6)	24	(33.3)	0.23
No	72	(77.4)	48	(66.7)	

Discriminant Function Analysis: Chi-square=54.61, df=8, $p<0.001$

Effects of Chronic Pain on Work

Respondents were requested to estimate the number of days pain prevented them from working or carrying out their usual activities in the preceding six months. Four individuals were unable to estimate the number of days lost and another four stated that they were unable to carry out their usual activities most of the time. The mean number of days lost from work or usual activities was 17.9 (SD 41.1) and the median was 6 days.

A median split was made of the chronic pain group (only those with chronic pain at the worst site, $n=165$). The median split was based on days lost from work or usual activities due to pain. The split consisted of those reporting 6 days or less lost from work or usual activities and those reporting >6 days. A discriminant function analysis was then performed to assess the prediction of membership in these two groups. One significant discriminant function was defined (Chi-square$=65.8$, df$=6$, $p<0.001$). The following variables contributed significantly to prediction of group membership: Pain Disability Index; trouble falling to sleep because of pain; criticism because of pain; and guilt from pain. The percentage of cases correctly classified into the two groups was 76.4%. The model was able to reduce the proportion of error in classifying cases over that of chance by 52%.

On average, those individuals who reported greater days lost from work or usual activities in the previous six months were older, obtained higher PDI scores, experienced less usual pain, and had long-standing chronic pain compared to those with ≤ 6 days lost. They also more frequently reported being criticized for their pain, having trouble falling to sleep, and being admitted to hospital for pain (Table 16).

Pain Disability Index

A modified Pain Disability Index was used to determine the effect of chronic pain on abilities to carry out work, chores, hobbies, social life and activities of daily living. The mean Pain Disability Index score was 12.2 (SD 12.5, maximum possible score 50 with two deleted items). A summary of the scores for the sub-categories of the Pain Disability Index are presented in Table 17.

Pearson correlations were computed between PDI score and a number of

Table 16
Prediction Variables for Number of Days Lost From Work or Usual Activities

Predictors	Lesser Days Lost		Greater Days Lost		Correlation of Variable With Function
Mean Pain Disability (SD)	8.5	(10.2)	21.4	(14.1)	0.74
Trouble Falling to Sleep (%)					
None	35	(43.8)	15	(17.6)	0.45
Infrequently	13	(16.2)	8	(9.4)	
1-3 nights/week	20	(25.0)	33	(38.8)	
4-6 nights/week	4	(5.0)	16	(18.8)	
Every night	8	(10.0)	13	(15.3)	
Criticized Due to Pain (%)					
Yes	9	(11.2)	32	(37.6)	0.45
No	71	(88.7)	53	(62.4)	
Guilt Due to Pain (%)					
Yes	14	(17.5)	31	(36.5)	0.41
No	66	(82.5)	54	(63.5)	
Admitted to Hospital for Pain (%)					
Yes	1	(1.2)	13	(15.3)	0.36
No	79	(98.7)	72	(84.7)	
Awakened by Pain (%)					
None	43	(53.7)	24	(28.2)	0.35
Infrequently	9	(11.2)	7	(8.2)	
1-3 nights/week	17	(21.2)	31	(36.5)	
4-6 nights/week	4	(5.0)	10	(11.8)	
Every night	7	(8.7)	13	(15.3)	

Table 16 (Continued)
Prediction Variables for Number of Days Lost From Work or Usual Activities

Predictors	Lesser Days Lost	Greater Days Lost	Correlation of Variable With Function
Mean Health Provider Visits (SD)	1.6 (1.5)	2.5 (1.7)	0.29
Mean Years Since Pain Onset (SD)	7.8 (9.1)	12.1 (11.8)	0.28
Mean Pain Medications Used (SD)	1.3 (1.0)	1.9 (1.2)	0.28
Health Compared to Age-mates (%)			0.26
Much better	5 (6.3)	4 (4.7)	
Better	21 (26.2)	19 (22.4)	
Same	41 (51.2)	28 (32.9)	
Worse	13 (16.2)	33 (38.8)	
Much worse	0	1 (1.2)	
Emergency Visit for Pain (%)			0.26
Yes	8 (10.0)	20 (23.5)	
No	72 (90.0)	65 (76.5)	
Mean Sites of Pain (SD)	2.1 (1.8)	2.7 (1.9)	0.23
Mean Worst Pain Intensity (SD)	7.6 (2.1)	8.2 (1.9)	0.21

Discriminant Function Analysis: Chi-square=65.84, df=6, $p<0.001$

Table 17
Pain Disability Index: Summary of Sub-Categories

Sub-Category	Mean Score (SD)	Range of Scores	Frequency
Family/Home Responsibilities	3.4 (3.1)	0-10	182
Recreation	4.1 (3.6)	0-10	182
Social Activity	3.0 (3.4)	0-10	182
Occupation	2.1 (2.8)	0-10	125
Life-Support Activity	1.6 (2.6)	0-10	182

variables. The PDI was positively but weakly correlated with the number of sites of pain ($r=0.22$, $p<.01$), time since first onset of pain ($r=0.17$, $p<0.05$), days lost from work or usual activities ($r=0.34$, $p<0.01$), number of health care providers consulted ($r=0.44$, $p<0.01$) and the number of medications used in the past month for pain ($r=0.32$, $p<0.01$). Higher scores on the PDI were associated with having a large number of sites of pain, long duration of pain and many days lost from work or usual activities. Higher PDI scores were also associated with greater numbers of health consultations and greater use of medications for pain.

A discriminant function analysis was performed to assess prediction of membership in three Pain Disability Index groups: total PDI score less than or equal to 5 (least disability); total PDI score greater than 5 but less than 19 (moderate disability); total PDI score greater than or equal to 19 (greatest disability). The significant predictors included number of health care providers consulted, number of days lost from work or usual activities in the past six months, worst and usual pain scores at the most troublesome site, feeling guilty due to the presence of pain, perception of general health, having been criticized for their pain, gender, maximum number of sites of pain, presence of pain at time of the interview, frequency of trouble falling to sleep or early awakening due to pain and medicentre or emergency department visits due to pain.

Two functions were defined and these contributed 84.4% and 15.6% of the variance, respectively (Table 18: Chi square=133.9, df=28, $p<0.001$; Chi square=26.3, df=13, $p<0.02$). Function 1 maximally discriminated those respondents with least disability from the other two groups. Significant predictors associated with function 1 were: number of health care providers consulted; days lost from work or activities; worst pain intensity; guilt; and difficulty falling to sleep.

The second discriminant function maximally discriminated the least and greatest disability groups with the moderate disability group falling between the least and greatest disability groups. The significant predictors were: general health and usual pain. The percentage of cases correctly classified into these three groups was 72.1%. The model reduced the proportion of error in classification (over chance) by

Table 18
Prediction Variables for Three Levels of Pain Disability

Predictor	Least		Moderate		Greatest		Correlation With Function 1	Correlation With Function 2
Mean Health Providers Seen (SD)	1.2	(1.1)	1.8	(1.1)	3.1	(1.9)	0.56	ns
Mean Days Lost (SD)	1.5	(3.2)	12.5	(30.4)	48.7	(65.3)	0.48	ns
Mean Worst Pain Intensity (SD)	7.1	(2.2)	7.6	(2.0)	9.0	(1.3)	0.44	ns
Guilt (%)								
Yes	3	(5.8)	13	(24.1)	29	(49.2)	0.43	ns
No	49	(94.2)	41	(75.9)	30	(50.8)		
Trouble Sleeping (%)								
None	23	(44.2)	18	(33.3)	9	(15.3)	0.41	ns
Infrequently	11	(21.2)	6	(11.1)	4	(6.8)		
1-3 nights/week	11	(21.2)	23	(42.6)	19	(32.2)		
4-6 nights/week	2	(3.8)	5	(9.3)	13	(22.0)		
Every night	5	(9.6)	2	(3.7)	14	(23.7)		
Early Awakening (%)								
None	32	(61.5)	21	(38.9)	14	(23.7)	0.36	ns
Infrequently	7	(13.5)	6	(11.1)	3	(5.1)		
1-3 nights/week	8	(15.4)	17	(31.5)	23	(39.0)		
4-6 nights/week	2	(3.8)	4	(7.4)	8	(13.6)		
Every night	3	(5.8)	6	(11.1)	11	(18.6)		

Table 18 (Continued)
Prediction Variables for Three Levels of Pain Disability

Predictor	Least		Moderate		Greatest		Correlation With Function 1	Correlation With Function 2
Criticized (%)								
Yes	5	(9.6)	11	(20.4)	25	(57.6)	0.34	ns
No	47	(90.4)	43	(79.6)	34	(42.4)		
Mean Pain Medications (SD)	1.1	(0.8)	1.6	(1.0)	2.1	(1.2)	0.33	ns
Admission to Hospital for Pain (%)								
Yes	1	(1.9)	2	(3.7)	11	(18.6)	0.30	ns
No	51	(98.1)	52	(96.3)	48	(81.4)		
Mean Sites of Pain (SD)	1.9	(1.3)	2.3	(1.8)	3.0	(2.2)	0.26	ns
General Health (%)								
Much worse	0		1	(1.9)	0		ns	0.48
Worse	4	(7.7)	16	(29.6)	26	(44.1)		
Same	24	(46.2)	25	(46.3)	20	(33.9)		
Better	18	(34.6)	10	(18.5)	12	(20.3)		
Much better	6	(11.5)	2	(3.7)	1	(1.7)		
Mean Usual Pain Most Troubled Site (SD)	2.9	(1.6)	2.4	(2.0)	4.1	(2.4)	ns	-0.45
Gender (%)								
Male	25	(48.1)	14	(25.9)	18	(30.5)	ns	-0.38
Female	27	(51.9)	40	(74.1)	41	(69.5)		

Table 18 (Continued)
Prediction Variables for Three Levels of Pain Disability

Predictors	Least		Moderate		Greatest		Correlation With Function 1	Correlation With Function 2
Pain at Time of Interview (%)							ns	0.25
Yes	19	(36.5)	29	(53.7)	33	(55.9)		
No	33	(63.5)	25	(46.3)	26	(44.1)		
Medicentre Visit for Pain (%)								
Yes	6	(11.5)	4	(7.4)	13	(22.0)		
No	46	(88.5)	50	(92.6)	46	(78.0)	ns	-0.22
Mean Age (SD)	43.2	(16.7)	43.0	(18.4)	44.0	(18.3)	ns	0.22

Discriminant Function Analysis: Chi-square=133.92, df=28, $p<0.001$ (Function 1)
Chi-square=26.35, df=13, $p<0.02$ (Function 2)

58%.

Effect of Chronic Pain on Sleep

Sleep disturbance from pain was assessed by the number of times per week that pain interfered with falling to sleep. This occurred in 125 (68.7%) of the 182 respondents with chronic pain. Early awakening from sleep, as a result of pain, occurred in 106 (58.2%) of the respondents. The frequencies per week of difficulty falling asleep and early awakenings are presented in Table 19.

Effect of Chronic Pain on Relationships

Forty-four (24.2%) of the individuals experiencing chronic pain said they had been criticized by others because of their pain or the way in which they dealt with it (Table 20). Comments included "my husband criticizes me", "someone has mentioned it" and "my sister says I should see the Doctor more often". Two individuals stated that they "don't talk about it with anyone" so as not to elicit negative comments. Those reporting criticism were more likely to report guilt about pain than those not reporting criticism (Table 21: Chi-Square=15.7, df=1, $p<0.001$). There were no differences in seeking advice (from friends or clergy) or in perceived health status for those who were or were not criticized about pain (Chi-Square). The intensity of pain at its worst and usual was not significantly different for those reporting or not reporting criticism (by ANOVA).

Forty-nine (26.9%) of the respondents stated that they felt guilty about how their pain affects others (Table 20). Comments included "I feel emotionally drained, can't cope with things like I should be able to" and "I can't pick up my grandchildren". Others stated that "I don't let it affect my life".

Those who did or did not express guilt about pain were not significantly different with regard to their gender or to seeking advice from friends or clergy (by Chi-Square). They were also not significantly different in terms of age and usual or worst chronic pain intensity at the most troublesome of three leading sites (by ANOVA). However, perception of own health (Table 22: Chi-Square=15.9, df=3, $p=0.001$) and number of days lost from work or usual activities were significantly different for those expressing or not expressing guilt (Mann-Whitney: z=-3.13,

Table 19
Frequencies of Sleep Difficulties From Chronic Pain

Rate of Occurrence	Trouble Falling to Sleep		Early Wakening From Sleep	
None	56	(30.8)	75	(41.2)
Infrequently	25	(13.7)	20	(11.0)
1-3 times per week	59	(32.4)	51	(28.0)
4-6 times per week	20	(11.0)	15	(8.2)
Every night	21	(11.5)	20	(11.0)
Don't know	1	(0.5)	1	(0.5)
Total	182	(100)	182	(100)

Table 20
Frequencies of Perceived Censure, Guilt and Advice-seeking

Behaviour	Reported		Not Reported		Total Subjects	
Criticism for Pain (%)	44	(24.2)	137	(75.3)	181	(100)
Guilt About Pain (%)	49	(26.9)	133	(73.1)	182	(100)
Sought Advice From Friends (%)	62	(34.1)	120	(65.9)	182	(100)
Consulted Clergy (%)	11	(6.0)	170	(93.4)	181	(100)

Table 21
Presence or Absence of Guilt by Presence or Absence of Criticism

	Presence of Guilt					
Presence of Criticism	No		Yes		Row Total (%)	
No						
Frequency (%)	100	(80.6)	24	(19.4)	124	(100.0)
Expected Value	90.2		33.8			
Yes						
Frequency (%)	20	(48.8)	21	(51.2)	41	(100.0)
Expected Value	29.8		11.2			
Column Total (%)	120	(72.7)	45	(27.3)	165	(100.0)

Chi-square = 15.7, df = 1, $p < 0.001$

Table 22
General Health by Presence or Absence of Guilt

Guilt	General Health: Much Better	Better	Same	Worse-Much Worse	Row Total (%)
No					
Frequency (%)	9 (6.9)	33 (25.4)	61 (46.9)	27 (20.8)	130 (100)
Expected Value	6.5	31.2	55.2	37.0	
Yes					
Frequency (%)	0	10 (20.4)	15 (30.6)	24 (49.0)	49 (100)
Expected Value	2.5	11.8	20.8	14.0	
Column Total (%)	9 (5.0)	43 (24.0)	76 (42.5)	51 (28.5)	179 (100.0)

Chi-square=15.9, df=3, p=0.001

p=.002). The mean rank for those expressing or not expressing guilt were 110.9 and 84.4, respectively. Those individuals who expressed guilt were more likely to rate their health as worse than their peers whereas those who did not report guilt were less likely to rate health as worse than peers. A greater number of days lost from work or usual activities occurred for those who reported guilt (mean=37.4) compared to those who did not (mean=16.2).

Health Care Utilization

In order to cope with their chronic pain, 34.1% (n=62) of respondents sought advice from friends and 6% (n=11) had consulted clergy. One hundred forty-six (80.2%) respondents had seen a health care provider for pain in the six months preceding the survey. The remainder (n=36, 19.8%) had not sought health care for a variety of reasons. The most common cited reasons included that: there was nothing that would help (n=21, 35.6%); pain was not severe enough (n=11, 18.6%); they could take care of themselves (n=5, 8.5%); and they had no time to seek health care (n=5, 8.5%). The responses are summarized in Table 23.

Table 24 illustrates health care providers who were consulted about pain as ranked by frequency of consultation. Respondents were allowed to name more than one health care provider. The number of health care providers consulted in the six months preceding the survey ranged from 0 to 9. Sixty-seven percent (n=122) had sought between one and three health care providers (Table 25). Thirty-four different health care providers were consulted. The most frequently consulted providers, in rank order, were family physician or general practitioner (frequency=137, 33.3% of all consultations), followed by specialist physicians (frequency=79, 19.2%) and pharmacists (frequency=48, 11.7%).

Twenty-six respondents (14.3%) stated that they had visited a medicentre because of chronic pain, while 33 (18.1%) went to an emergency department. Another sixteen (8.8%) respondents stated they were admitted to hospital for management of chronic pain (Table 26).

Almost all respondents reported using at least one medication in the month prior to the survey. The maximum number of medications used was six (Table 27).

Table 23
Reasons For Not Seeking Health Care

Stated Reason	Frequency
Don't believe anyone can help.	21
Costs too much or would cause a loss in income.	2
Did not need to; pain not severe enough.	11
Friends or family took care of me.	1
Cannot get day care.	1
Can take care of myself.	5
No time.	5
Not believed and need to see military doctor first.	1
Do not trust doctors.	1
Saw doctor 1 year ago and have multiple refills for painkillers.	2
Scared to find cause of pain (cancer).	1
Do not want to drain health care system.	1
Part of old age.	1
Just need to grin and bear it.	1
Just pass it off.	1
Can relieve pain if I rest and get proper conditioning.	1
No vehicle; think about my kids first.	1
Work related stress; if job slows down, so will the headaches.	1
Do not want to go to the Emergency, better to suffer (migraine).	1
Total Reasons[1]	59

[1] Respondents could state more than one reason for not seeking health care

Table 24
Type and Frequency of Health Care Providers Consulted in Six Months Preceding Survey

Health Care Provider	Frequency (%)		Subjects Responding (%)
Family physician	137	(33.3)	(91.3)
Medical specialist	79	(19.2)	(52.8)
Pharmacist	48	(11.7)	(32.0)
Physiotherapist	34	(8.3)	(22.7)
Chiropractor	33	(8.0)	(22.0)
Worker's Compensation Board Staff	12	(2.9)	(8.0)
Dentist	9	(2.2)	(6.0)
Massage therapist	5	(1.2)	(3.3)
Acupuncturist	4	(1.0)	(2.7)
Public health nurse	3	(0.7)	(2.0)
Podiatrist	3	(0.7)	(2.0)
Psychologist	3	(0.7)	(2.0)
Naturopath	3	(0.7)	(2.0)
Pain clinic	2	(0.5)	(1.3)
None consulted	36	(8.8)	(19.8)
Total	411		

Table 25
Frequencies of Number of Health Care Providers Consulted for Pain in Six Months Prior to Survey

Number of Providers	Frequency (%)	
0	32	(17.6)
1	36	(19.8)
2	53	(29.1)
3	33	(18.1)
4	17	(9.3)
5	5	(2.7)
6	4	(2.2)
8	1	(0.5)
9	1	(0.5)
Total Respondents	182	

Table 26
Frequencies of Visits to Health Care Facilities for Pain

Health Care Facility	Visited(%)		Did Not Visit(%)	
Medicentre	26	(14.3)	156	(85.7)
Emergency Department	33	(18.1)	149	(81.9)
Hospital (in-patient)	16	(8.8)	166	(91.2)

Table 27
Frequencies of Total Number of Different Pain Medications Used in Month Preceding Interview

Total Pain Medications	Frequency (%)	
0	26	(14.3)
1	70	(38.5)
2	48	(26.4)
3	29	(15.9)
4	7	(3.8)
6	1	(0.5)
Refused	1	(0.5)
Total Respondents	182	

The most commonly used medications included non-prescription analgesics like ASA, acetaminophen and non-steroidal anti-inflammatory agents (for example, ibuprofen) (frequency=122, 42.5%). Next to non-prescription analgesics, prescription analgesics containing opioids were used most frequently (frequency=63, 22.0%) and prescribed non-steroidal anti-inflammatory agents (frequency=20, 7.0%). The frequencies of medications used was greater than the number of subjects reporting pain as respondents could name multiple medications. The types and frequencies of medications used in the month prior to interview are presented in Table 28.

Gender Differences in Chronic Pain

There were no significant differences between males and females for the following variables: presence of pain at time of interview, use of medicentres, emergency rooms and admission to hospital due to pain, perception of being criticized about pain, feeling guilty about the way in which their pain affects others and respondents' rating of health (by Chi-Square). There were also no significant differences for males and females for length of time since onset of chronic pain, number of days lost from work or usual activities and Pain Disability score, and usual pain intensity at the most troublesome site (by ANOVA). There was, however, a significant difference between males and females for worst pain at the most troublesome site, with females rating their mean pain at 8.2 (SD 1.8, n=120) compared to a mean pain of 7.3 (SD 2.2, n=62) for males (Table 29: ANOVA: $F=9.28$; $df=1,180$; $p=0.003$).

Age and Chronic Pain

For those respondents with chronic pain at the most troublesome site (n=165), there were non-significant and near zero correlations between age and: (1) usual or worst pain at that site; (2) number of pain sites; (3) duration of pain; (4) Pain Disability Index score; (5) number of health care providers consulted; or (6) number of medications used for pain. There were, however, modest Pearson correlations between age and: (1) length of time since the onset of pain ($r=0.34$, $p<0.01$); (2) frequency of pain episodes ($r=0.25$, $p<0.01$); and (3) number of days lost from work or usual activities ($r=0.16$, $p<0.05$). Ages of respondents were significantly

Table 28
Type and Frequencies of Medications Taken in Month Preceding Interview

Medication	Frequency (%)		Respondents Reporting (%)
Non-prescription analgesics	122	(42.5)	(78.7)
Prescription analgesics	63	(22.0)	(40.6)
Prescribed NSAID	20	(7.0)	(12.9)
Topical agents	14	(4.9)	(9.0)
Tranquilisers or sedatives	11	(3.8)	(7.1)
Hypnotics	11	(3.8)	(7.1)
Alcohol	10	(3.5)	(6.5)
Antidepressants	9	(3.1)	(5.8)
Muscle relaxants	7	(2.4)	(4.5)
Anti-convulsants	4	(1.4)	(2.6)
Beta blockers	3	(1.0)	(1.9)
Anti-ulcer medications	3	(1.0)	(1.9)
Ergot derivatives	2	(0.7)	(1.3)
Calcium channel blockers	2	(0.7)	(1.3)
Homeopathic	2	(0.7)	(1.3)
Vitamins	2	(0.7)	(1.3)
Antacids	1	(0.3)	(0.6)
Nitroglycerin	1	(0.3)	(0.6)
Total[1]	287		

[1]More medications reported than respondents with chronic pain because they could provide an unlimited number of medications.

Table 29
ANOVA Summary Table: Intensity of Pain by Gender

Source	MS	df	F
Gender	35.67	1	9.28
Error	3.85	180	

ANOVA: F=9.28; df=1,180; p=0.003

Mean Pain: Males 7.3 (sd 2.2, n=62)
Females 8.2 (sd 1.8, n=120)

different for those reporting occurrence or non-occurrence of pain at the time of the interview (Table 30: ANOVA: $F=5.71$; $df=1,180$; $p=0.02$). Those who had pain during the interviews were significantly older (mean 46.1, SD 18.1) than those without interview pain (mean 40.0, SD 16.3).

Discussion

The results of this study indicate that chronic pain is widespread. With a rate of 443 per 1000 adults, approximately 204,602 adults in Edmonton could have chronic pain. The prevalence rate obtained in this study (44.3%) is consistent with those recently obtained in Denmark (Andersen & Worm-Pedersen, 1987) and in Sweden (Brattberg et al., 1989). It is, however, much higher than rates obtained 10 years ago in Canada by Crook et al., (11%).

The primary difference among the studies is the method of sampling. The three studies with comparable prevalence rates (including the current study) employed random samples of the general population whereas Crook's study did not. As mentioned earlier, Crook's sampling methods are likely to have produced a biased sample, making her prevalence rate suspect. Although her rates are widely quoted, they likely underestimate the true prevalence rate significantly.

While it appears that many people have chronic pain, not all are equally troubled by it. Moreover, those who are distressed by chronic pain are not equally influenced in all areas.

Chronic pain may affect work attendance, activities of daily living and interpersonal relationships. It may also result in economic costs to the individual and society. In this study, people reported the full breadth of consequences of chronic pain (from virtually no disruption to far-reaching ones).

One consequence of chronic pain for the individual and society is the impact on employment. While it is difficult to establish the exact cost associated with chronic pain, the costs to society are enormous and varied. Costs are incurred through sick pay, disability claims, worker's compensation claims, retraining and replacement of workers. Although a number of individuals continue to work despite chronic pain, there is a potiential cost to industry because of decreased productivity among

Table 30
ANOVA Summary Table: Age by Presence or Absence of Pain During Interview

Source	MS	df	F
Interview Pain	1687.38	1	5.71
Error	295.75	180	

ANOVA: F=5.71; df=1,180; p=0.02

Mean Age: Present 46.1 (sd 18.1, n=88)
Absent 40.0 (sd 16.3, n=94)

individuals who are restricted in their abilitites to perform. It has been estimated that a disabled worker costs an organization three times that person's income in productivity loss (Howes, 1994).

The annual cost in Canada for painful injuries affecting only clerical workers is $625 million, as computed by the Worker's Compensation Board of Ontario (Globe and Mail, October 13, 1992, p.C14). It is estimated that the number of chronic pain patients funded annually by the Worker's Compensation Board of Ontario is 20,000 (Daily Commercial News, January 10, 1992, p.1,3).

The current study provided evidence that chronic pain is associated with loss of employment or employability. Those who were free of pain were more likely to work full-time compared to those with pain. As well, those with pain were more likely to be unable to work or to be unemployed than those who did not report pain. They also rated their health as poorer than those without pain.

A significant consequence of pain on employment relates to days lost from work. The average number of days lost over six months which respondents attributed to chronic pain was 17.9. Since the median number of days lost was six, some individuals with substantial numbers of days lost were responsible for skewing the distribution. Regardless of whether or not the effect on employment primarily comes from a few or is distributed evenly over all individuals, the effect in this geographic region is substantial. Given the total number of adults in Edmonton who could experience chronic pain (based on a 44.3% rate), an estimated 3.7 million days could be lost (from work or usual activities) because of chronic pain alone.

It is difficult to calculate the cost of chronic pain for those who are not part of the workforce as a result of retirement or of being unable to participate. Since these individuals are not claiming sick time or disability payments, the cost of their chronic pain is not reflected in the statistics kept by Worker's Compensation Boards or the insurance industry. Nonetheless, their chronic pain can be a cost to society through decreased ability to provide a contribution to the infrastructure of Canadian society through, for example, volunteer activities.

An additional cost to society is reflected in direct costs to the health care

system through, for example, the number of health care providers consulted for chronic pain and the costs of treatments. The number of medications consumed by those suffering from pain and the cost of alternative or adjunct pain treatments not covered by health care plans must be borne by the individual or society.

While approximately one-fifth of the respondents did not seek health care in the six months preceding the interview, more than two-thirds consulted from one to three health care providers. The total number of visits in the sample, including visits to physician's offices, medicentres, emergency departments and hospitals (i.e. inpatient admissions) was 450 (approximately 2.5 per person with chronic pain). Extrapolating from the number of visits in the sample, in the range of a million visits per year would be estimated for the City of Edmonton. This would include almost 75,000 emergency department visits per year and about 36,000 hospital admissions where chronic pain was a concern to the patient.

The majority of health care was obtained from general practitioners or family physicians. Few respondents obtained care from other health care providers such as nurses, physiotherapists, chiropractors, acupuncturists, psychologists or pain clinics. It should be noted that at the time of this survey, physicians constitute the point-of-entry into the health care system. Individuals may not know about or be referred to these professionals or services or may not be able to afford them. Their costs may be covered partially or not at all by the Alberta Health Care Insurance Commission or private insurance providers resulting in out-of-pocket expenses to the patient.

Medications appear to be significant in the management of chronic pain as reflected by the results of this study. Over 85% of the respondents utilized medications for pain in the month preceding the interview. While a large range of types of medications were reported by respondents, the majority utilized both non-prescription and prescription analgesics. Again, the costs of these medications are reflected in the costs to those seeking relief from pain and/or insurance providers.

It is difficult to estimate the real costs to the health care system because of a number of issues. Record keeping by health care providers may not reflect the patient's presenting problem or greatest concern. Discharge diagnoses from hospital

records (with ICD-9 codes or Diagnostic Related Groups) may also not reflect these. Patients may be treated for the potential consequences of chronic pain, such as depression, anxiety, substance abuse or effects of medication interactions. However, the origin of these consequences may not be reflected in the statistics maintained by health care organizations. Ultimately, these factors lead to an underestimation of the costs associated with chronic pain. Future research on chronic pain prevalence, costs and consequences will require meticulous planning to capture data which give a true picture of chronic pain.

Individuals reported interferences in ability to perform chores around the house, to engage in recreation and social activities. Few respondents reported interference to any extent in the area of self-care as demonstrated by the ability to perform those activities such as dressing, taking a shower or driving. While pain may not have affected respondent's ability to care for themselves, it resulted in disruptions to the normal activities expected by families; pleasurable activities such as sports, hobbies and socializing, those which normally result in interactions with others.

The implications of these findings are that individuals may not be able to engage in activities considered to be part of family life, resulting in criticism about his/her ways of dealing with pain. This can cause guilt about the effect of pain on others. Both criticism and guilt were reported by many individuals in this study.

Chronic pain can result in isolation, as the individual may be able to carry out those activities considered essential to day-to-day living but unable to engage in those activities requiring interaction with others on a social level. It is conceivable that this may result in disruptions in family dynamics and loss of social supports which ultimately may correlate with depressive symptoms. Furthermore, chronic pain disrupts those leisure activities considered to be an outlet for stress.

It was the intent of this study to begin to determine the potential effect of pain on interpersonal relationships. Further study is needed to effectively determine the relationship between chronic pain and interpersonal relationships. The use of longitudinal studies would provide valuable information on this topic.

The Pain Disability Index, which was utilized in this study, appears to be the

most satisfactory tool of its type. Nonetheless, it did not perform as well as reported. The tool has had insufficient attention paid to psychometric properties. One item was perplexing to respondents in the pilot study and therefore was dropped. Another was not useful for telephone surveys. A number of respondents had difficulty understanding the intent of the Pain Disability Index questions. It often required repeated explanation to differentiate impact from frequency of interference.

Even considering the effect of dropped items on the total score, it appears that the scores in this study were lower than those of Tait et al (1990), primarily because they used a sample from a chronic pain clinic, a group which could be expected to suffer more disability than the general population. As a consequence, there were no normative data on which to base decisions about what a high or low level of pain disability is. Therefore, subjects were divided into three groups on the basis of frequency distribution of scores (a similar approach was taken by Tait et al., 1990). It is, therefore, impossible to say how great or little the disability from pain is in this sample. In other words, we have no data with which to document troublesomeness of pain.

It should be stated that if pain disability is to be part of the definition of chronic pain, as many have argued, then attention must be paid to the development or refinement of a tool for measuring disability.

There was no evidence in this study that people without chronic pain were younger than those with chronic pain; therefore, a commonly held belief was not supported. Age was not associated with increased health care utilization, as measured by health care provider contact. Older people also did report greater use of pain medications. The lack of relationship between age and utilization or medication use supports the findings of Von Korff et al (1991).

The response rate of this survey (69.3%) was consistent with telephone surveys in general (Lavrakas, 1987) and the Population Laboratory surveys, in particular. The All-Alberta Survey, conducted by the Population Research Laboratory at the University of Alberta, achieves a 72% to 75% completion rate (Kinzel, 1992). The response rate for this study may have been higher if the number of attempts at

reaching the respondents was not limited to five. However, due to time and financial restraints, this was not possible.

Limitations

The limitations of the telephone survey are that those individuals who are transient or could not afford a telephone could not be interviewed. Since less than 2% of the population does not have a telephone, a small number of people were excluded (Edmonton Telephones, Personal Communication, 1993). Those individuals who were hospitalized, or living in extended care facilities such as nursing homes were also excluded. Since these individuals are generally suffering from chronic illnesses, they potentially could have chronic pain. These individuals were indirectly excluded as only householders residing at home during the time of the survey could be included. The result of this exclusion is that the prevalence rate may have been underestimated.

Those individuals who had pain may have been more likely to cooperate with the interviewer than those who were not experiencing pain. As a result, it is possible that the nonrespondents were more likely to not have pain. If so, the prevalence rate for pain would have been inflated.

It was noted that the sample contained a higher rate of females than existed in the population. When examining the refusal rates, it was determined that males were more likely to refuse to participate than females when selected as the household respondent, resulting in the female occupant being asked to (and agreeing to participate). This resulted in the uneven frequencies of males and females in the study. It is unclear whether having more females may or may not have altered any gender differences noted in this study. However, the subject of gender differences deserves closer scrutiny.

The results of this study are generalizable only to the population sampled, that is, this particular urban population. Other populations, including rural ones, could potentially have different characteristics, be exposed to different factors (as causes of chronic pain), and have different health care resources available for the treatment of chronic pain.

This study relied solely on self-report and would have been strengthened by

the ability to validate the medical reasons for pain and frequency and type of health care utilization by the respondents.

It is recognized that the use of a six month recall period potentially increases the number of reported painful episodes, especially pain episodes which tend to be episodic in nature (for example, migraine headaches). However, as the recall interval increases, there may be a tradeoff in the accuracy of recall about the number, intensity and persistence of pain episodes.

Implications for Research

It would be important to survey other populations, such as rural areas, to determine the prevalence of chronic pain and its effect on the individual and their health care utilization. It would be useful to utilize the same definition of chronic pain in order to provide the ability to compare data. While the intent of this study was not to study the psychological dimensions of chronic pain or the impact of chronic pain on the family, it would be important to incorporate these aspects in future epidemiologic surveys.

Longitudinal studies are needed to examine the course of chronic pain. Potential advantages include the identification of risk factors for chronic pain, evaluation of treatments and measurement of costs to the individual, the health care system and society at large.

Implications for Health Services

It is apparent from this study that the majority of health care for chronic pain is managed by the family physician and relies heavily on the use of medications. Only two respondents identified utilizing a pain clinic for the management of their pain, while many individuals volunteered that if this option were available, they would seek referral to it. Multidisciplinary approaches to pain management, the preferred approach, is apparently lacking in this region.

Knowing the prevalence of chronic pain in the population of Edmonton can provide health care programmers with needed information in order to make decisions about future health care needs. In addition, this study may serve as an impetus to those administering health services to assure that adequate health services data are

collected about problems like chronic pain.

Implications for Education

Nurses and other health care providers are generally unaware of the large numbers of adults who suffer from chronic pain and its consequences. It has been shown that education of nurses about pain is neither comprehensive nor accurate (Romyn, 1990; Williams, 1992). Utilizing information from prevalence studies, such as this one, to teach nurses about pain can serve to improve clinical practice.

It is also important to educate the public that there are methods to manage both acute and chronic pain. Emphasis should be placed on dispelling myths about pain and providing education on the options available for those suffering from both acute and chronic pain. This is turn may result in increased demands for improved pain management services.

Conclusions

The number of individuals with chronic pain and their reasons for not seeking health care provides an indication that chronic pain is not well managed in this region. There is sufficient evidence that the costs of chronic pain can be reduced by the provision of better care. It is therefore recommended that priority be given to developing services for management of chronic pain.

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Appendix A: Summary of Previous Epidemiologic Studies on Pain

Author and Reference	Population, Sample and Method	Demographics	Prevalence of Pain	Definition of Pain Group	Measured Variables
Anderson & Worm-Pederson (1987)	Random survey of 4000 adults in Denmark mail survey	Mean age = 45.2 years. Range = not given but greater than 18 years. Male = 45.5% Female = 54.5%	Temporary Pain = 17% Persistent Pain = 38%	Temporary = experienced pain within past two weeks. Persistent pain = experienced pain within past two weeks and often troubled by pain.	Anatomical area Health care utilization medication usage
Brattberg, Thorslund & Wikman (1989)	Random survey of 1009 adults in Sweden mail survey/survey & telephone survey of non-responders.	Mean age = not reported. Range = 18-84 years. %Male = not reported. %Female = not reported.	Prevalence of any pain or discomfort = 66%. Prevalance of "obvious pain" = 40%.	Obvious pain = affecting an individual to quite a high degree for more than 6 months.	Anatomical area. Intensity, duration, perceived effect of pain. Disability.

Author and Reference	Population, Sample and Method	Demographics	Prevalence of Pain	Definition of Pain Group	Measured Variables
Crook, Rideout & Brown (1984)	500 randomly selected households from a Family Practice roster.	Mean age = 43.1 years. Range - 18-91 years. Male = 48.2% Female = 51.7%	Temporary pain = 5%. Persistent = 11%.	Temporary = experienced pain within past two weeks. Persistent = experienced pain within past two weeks and often troubled by pain.	Etiology of pain. Anatomical area. Health care utilization. Pain relief measures. Disability.
James, Large, Bushnell & Wells (1991)	Random sample of 1498 adults in New Zealand. Urban area completing Diagnostic Interview Schedule. Pain complaints determined from somatisation sub-scale. Face-to-face interview.	Mean age = not reported. Range = 18-64 years. 18-24 years (17%) 25-44 years (57%) 45-64 years (26%) Male = 33% Female = 66% (Oversampled due to main purpose of study investigating eating disorders).	81.7% respondents reported a pain experience. Prevalence estimates obtained by design weighting and post-stratification to match census results.	Pain recorded as significant if severe enought to warrant health care or led to medication usage (more than once) or interfered with life or activities significantly.	Anatomical site. Pain differentiate between physical, psychological or unknown cause.

Author and Reference	Population, Sample and Method	Demographics	Prevalence of Pain	Definition of Pain Group	Measured Variables
Taylor & Curran (1985)	Stratifiedunclustered sample of 1254 adults in United States. Telephone survey.	Mean age = not reported. 18-34 years (38%) 35-64 years (47%) 65 years + (14%) Male = 48% Female = 52%	No total prevalence rate given. Prevalence rates for pain lasting > 3 months: Headaches 5% Backache 9% Muscle Pain 5% Joint Pain 11%	Chronic pain defined as pain present greater than 100 days per year.	Severity Etiology Disability Health care utilization Medication usage Self-reported stress Health locus of control.
Von Korff, Dworkin, Le Resche & Kruger (1988)	Stratified sample of 1500 enrollees of Group Health Cooperative in greater Seattle area. Mail; telephone survey.	Mean age = not reported. 18-24 years (9.7%) 25-44 years (64.1%) 45-64 years (18.6%) 65 years + (7.6%) Range = 18-75 years Male = 41.6% Female = 58.4%	No total prevalence rate given. Presence of body area in past six months: Back (41%) Headache (26%) Abdominal (17%) Chest (12%) Facial (12%)	Persistent pain = present on more than half the days in the past six months.	Intensity, duration, onset of pain. Interference due to pain. Psychological distress (SCL-90). Health care contact. Volume of ambulatory care visits and medication use.

Appendix B: Introductory Statement, Randomization and Verbal Consent

Prevalence of Chronic Pain Study

INTRODUCTION

Subject # _____

Hello, I'm calling from the Pain Research Lab in the Faculty of Nursing at the University of Alberta. My name is _____, a Graduate student in Nursing.

I have dialled XXX-XXXX. Is this correct?

Your telephone number was selected at random by computer. Just a moment of your time to explain why I'm calling.

The Lab at the University, is currently conducting an important study on pain that is experienced by people in Edmonton. We are interested in talking to both people who are or are not having pain.

In order to have a sample that is valued, I need to speak with the person in your household who is 18 years or older and who had the most recent birthday. That is, the person who had the last birthday. Would you be that person?

IF YES, CONTINUE INTERVIEW
IF NO, "May I speak with that person in your household who had the last birthday?
(REPEAT INTRODUCTION IF THAT PERSON AVAILABLE)
(IF NOT AVAILABLE, obtain the first name and make an appointment to call back)

_____

(IF WILL NOT BE AVAILABLE): "May I speak with the person in your household who had the next last birthday?"

I would like to interview you. I'm hoping that now is a good time for you. The information you provide is very important for the work that is being done at the University of Alberta.

Before we start, let me tell you that it is your decision to participate. Any information you provide will be kept confidential. I do not know your name (last name) or address - only your telephone number. If you do not wish to answer any of the questions I am about to ask, please feel free to point these out to me and we'll go on to the next question. You, of course, have the right to stop at any time.

[OPTIONAL READ] We do not need your name, so that no one will know your answers to these questions. If you have any questions about the survey, you can call the "Pain Research Lab" in the Faculty of Nursing at 492-6317 for further information.

Appendix C: Survey Questionnaire

Prevalence of Pain Questionnaire

[READ SLOWLY]

We are interested in talking to people **who are or are not** having pain. We are interested in several types of pain. One is pain that has lasted 1 day or more in the past six months. The other is pain that occurred more than once (several times) over the past six months.**[PAUSE]** Do not include aches or pains that are very short lasting or barely noticeable such as sore muscles after exercising or a bruise.

Do you now have or have you had since May (past six months) any pain or discomfort in your (read body area)_____?

Head ☐
Neck ☐
Shoulders ☐ /Arms ☐ /Elbows ☐ /Hands ☐
Chest ☐
Abdomen ☐
Back ☐
Hips ☐ /Legs ☐ /Knees☐ /Feet☐
Other ☐ _____
(all over)☐

****IF NO, GO TO "NO REPORTED PAIN" SECTION AND DEMOGRAPHICS (BLUE)**

[For those with at least one other type of pain:]

You said that _____(Body sites listed) were pain problems that you had or have now.

Please tell me which is the most troublesome for you, followed by the second most troublesome and the next most troublesome.

[If all of these pain problems are equally troublesome:]

I would like to ask you some questions about three of these pain problems. Can you pick three of these pain problems to talk about ?

Site 1/Rank 1	Site 2/Rank 2	Site 3/Rank 3

Site 1/Rank 1

5. Have you seen a medical doctor about your pain? No Yes
6. If YES, what did your doctor say causes the pain in your _____ (site) ?

_____

7. What do you think it is?

_____

8. If NO, what do you think causes the pain in your _____(site)? _____

Site 2/Rank 2

9. Have you seen a medical doctor about your pain? No Yes
10. If YES, what did your doctor say causes the pain in your _____ (site) ?

_____

11. What do you think it is?

_____

12. If NO, what do you think causes the pain in your _____(site)? _____

Site 3/Rank 3

13. Have you seen a medical doctor about your pain? No Yes
14. If YES, what did your doctor say causes the pain in your _____ (site) ?

_____

15. What do you think it is?

_____

16. If NO, what do you think causes the pain in your _____(site)? _____

[CHECK OFF IF ELABORATED/ELABORATE AS NECESSARY]

For the pain in your (Site) _____, did your pain begin because of an:

Accident ☐ **If Accident: At work** ☐ **At home** ☐ **Other Accident** ☐
After an operation (surgery) ☐
It just began one day ☐
Other _____
Don't know ☐
Refused ☐

Site 1/Rank 1

For the pain in your (Site) _____, did your pain begin because of an:

Accident ☐ **If Accident: At work** ☐ **At home** ☐ **Other Accident** ☐
After an operation (surgery) ☐
It just began one day ☐
Other _____
Don't know ☐
Refused ☐

Site 2/Rank 2

For the pain in your (Site) _____, did your pain begin because of an:

Accident **If Accident: At work** ☐ **At home** ☐ **Other Accident** ☐
After an operation (surgery) ☐
It just began one day ☐
Other _____
Don't know ☐
Refused ☐

Site 3/Rank 3

THESE NEXT QUESTIONS ARE ABOUT HOW LONG YOU HAVE HAD PAIN AND HOW OFTEN IT OCCURS:

Site1/Rank1

How long ago did this pain first start? _____
Do you now have pain in your _____ (Site)? Yes ☐ No ☐
How long ago did your pain stop? _____
Typically, how often does this happen in a month?
1-2 times ☐
3-10 times ☐
>10 times ☐

When you experience pain in your _____(site), how long does it last?

< 1 hour ☐
1-3 hours ☐
4-8 hours ☐
9-12 hours ☐
13-16 hours ☐
17-20 hours ☐
21-24 hours ☐
> 24 hours ☐

Site2/Rank2

How long ago did this pain first start? _____
Do you now have pain in your _____ (Site)? Yes ☐ No ☐
How long ago did your pain stop? _____
Typically, how often does this happen in a month?
1-2 times ☐
3-10 times ☐ >10 times ☐

When you experience pain in your _____(site), how long does it last?

< 1 hour ☐
1-3 hours ☐
4-8 hours ☐
9-12 hours ☐
13-16 hours ☐
17-20 hours ☐
21-24 hours ☐
> 24 hours ☐

Site3/Rank3

How long ago did this pain first start? _____
Do you now have pain in your _____ (Site)? Yes ☐ No ☐
How long ago did your pain stop? _____
Typically, how often does this happen in a month?
1-2 times ☐
3-10 times ☐ >10 times ☐

When you experience pain in your _____(site), how long does it last?

< 1 hour ☐
1-3 hours ☐
4-8 hours ☐
9-12 hours ☐
13-16 hours ☐
17-20 hours ☐
21-24 hours ☐
> 24 hours ☐

THE NEXT QUESTION IS ABOUT THE AMOUNT OF PAIN YOU HAVE:

Please answer on a scale that goes from "0" to "10", where "0" represents no pain and "10" means the worst possible pain. You can choose any number between "0" to "10".

What is the number of your (site) pain when it is at its worst? _____

What is the number of your (site) pain when it is at its usual? _____

Don't know ☐

Refuse ☐

What is the number of your (site) pain when it is at its worst? _____

What is the number of your (site) pain when it is at its usual? _____

Don't know ☐

Refuse ☐

What is the number of your (site) pain when it is at its worst? _____

What is the number of your (site) pain when it is at its usual? _____

Don't know ☐

Refuse ☐

THE FOLLOWING QUESTIONS ARE ABOUT HOW PAIN AFFECTS YOUR LIFE.

We would like to ask you some questions about how pain has affected your daily life. We would like to know how much your pain is preventing you from doing what you normally do or from doing it as well as you normally would. We are interested in the overall effect of pain in your life, not just when the pain is at it worst.

About how many days in the past six months has pain prevented you from working or doing the things you normally do in your day?

Days _____

Don't know ☐
Refused ☐

For each of the following questions please answer on a scale of "0" to "10" where "0" means pain is **NOT AT ALL** preventing you from doing what you normally do and "10" means that **ALL** of the things you would normally do are prevented by your pain. You can choose any number between "0" and "10".

In the past six months how much has pain interfered with you doing chores or duties around the house (e.g. yard work) and errands or favours for other family members? (e.g. driving the children to school).

_____

Don't know ☐
Refused ☐

In the past six months how much has pain interfered with you doing hobbies, sports or other similar leisure time activities?

_____

Don't know ☐
Refused ☐

In the past six months how much has pain interfered with you doing activities with friends and acquaintances other than your family? This could include parties, concerts, dining out and other social functions.

_____

Don't know ☐
Refused ☐

If you have a job outside of the home, in the past six months how much has pain interfered with you doing activities which are related to your job?

_____

Don't know ☐
Refused ☐

In the past six months how much has pain interfered with you doing the activities that you would normally do to take care of yourself such as taking a shower, getting dressed or driving?

_____

Don't know ☐
Refused ☐

THESE NEXT QUESTIONS ARE ABOUT SLEEP:

In the past six months how many times have you had trouble falling to sleep DUE TO PAIN. Has it been NONE, ONE TO THREE TIMES PER WEEK, FOUR TO SIX TIMES PER WEEK OR EVERY NIGHT?

None ☐
One to three times per week ☐
Four to six times per week ☐
Every night ☐

Don't know ☐
Refuse ☐

In the past six months how many times have you been awakened from your sleep DUE TO PAIN:
Has it been NONE, ONE TO THREE TIMES PER WEEK, FOUR TO SIX TIMES PER WEEK OR EVERY NIGHT?

None ☐
One to three times per week ☐
Four to six times per week ☐
Every night ☐

Don't know ☐
Refuse ☐

I WOULD NOW LIKE TO ASK YOU SOME QUESTIONS ABOUT WHAT YOU HAVE DONE TO RELIEVE YOUR PAIN:

In the past six months have you asked for advice from friends or acquaintances about your pain?

Yes ☐
No ☐

Don't know ☐
Refuse ☐

In the past six months have you talked to a religious leader such as a minister, priest or rabbi about your pain?

Yes ☐
No ☐

Don't know ☐
Refuse ☐

In the past six months have you had an appointment and seen any of the following because of your pain:

(READ AND LIST BELOW)
Family Doctor ☐
Medical Specialist (Record all)– _____
Dentist (Dental, Headache or TMJ Pain only) ☐
Public or Community Health Nurse ☐
Pain Clinic ☐
Worker's Compensation Board ☐
Physiotherapist ☐
Chiropractor ☐
Podiatrist ☐
Psychologist ☐
Social Worker ☐
Acupuncturist/Accupressurist ☐
Massage Therapist ☐
Naturopath/Herbalist ☐
Hypnotist ☐
Other – _____

In the past six months have you talked to a Pharmacist about your pain?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

In the past six months have you visited a Medicentre because of your pain?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

In the past six months have you visited an Emergency Room (Department) because of your pain?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

In the past six months have you been admitted in to the hospital overnight because of your pain?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

For individuals who have NOT consulted a health care provider:

Can you tell me your reason for not seeing any of these health care providers about your pain:

DON'T READ/CAN HAVE MORE THAN ONE REASON:

Didn't need to/pain not severe enough ☐
Didn't need to/my family or friends took care of me ☐
Cost too much money ☐
Don't believe anyone can help my pain ☐
Day care ☐
Other reasons (specify) _____
Don't know ☐
Refused ☐

Have you taken any of the following medicines in the past month because of your pain?

Non-prescription Pain Killers (e.g. Aspirin, Tylenol) ☐
Prescription Pain Killers (e.g. Tylenol #3, Percocet) ☐
Sleeping Pills (e.g. Halcion, Dalmane) ☐
Antidepressants (e.g. Elavil) ☐
Tranquilizers/Sedatives (e.g. Ativan, Valium) ☐
Alcohol ☐
Any other medication (specify) _____

THESE NEXT QUESTIONS ARE SOME GENERAL QUESTIONS ABOUT YOU:

In general, compared to other persons your age would you say your health is (READ):

Much better ☐
Better ☐
Same ☐
Worse ☐
Much worse ☐
Don't know ☐
Refuse ☐

In the past six months, have people criticized you about the pain or the way you deal with it?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

In the past six months, have you felt guilty or worried about the way in which your pain affects others?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

***GO TO DEMOGRAPHICS (PINK)**

FOR THOSE WHO REPORT NO PAIN IN THE PAST SIX MONTHS:

THESE NEXT QUESTIONS ABOUT YOUR HEALTH:

In the past six months have you had an appointment and seen any of the following:

(READ AND LIST BELOW)
Family Doctor ☐
Medical Specialist (Record all) ☐ _____
Dentist ☐
Public or Community Health Nurse ☐
Worker's Compensation Board ☐
Physiotherapist ☐
Chiropractor ☐
Podiatrist ☐
Psychologist ☐
Social Worker ☐
Acupuncturist/Accupressurist ☐
Massage Therapist ☐
Naturopath/Herbalist ☐
Hypnotist ☐
Other _____

In the past six months have you talked to a Pharmacist for health advice?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

In the past six months have you visited a Medicentre?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

In the past six months have you visited an Emergency Room (Department)?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

In the past six months have you been admitted in to the hospital overnight?

Yes ☐
No ☐
Don't know ☐
Refuse ☐

THESE NEXT QUESTIONS ARE ABOUT SLEEP:

In the past six months how many times have you had trouble falling to sleep? Has it been NONE, ONE TO THREE TIMES PER WEEK, FOUR TO SIX TIMES PER WEEK OR EVERY NIGHT?

None ☐
One to three times per week ☐
Four to six times per week ☐
Every night ☐
Don't know ☐
Refuse ☐

In the past six months how many times have you been awakened from your sleep?
Has it been NONE, ONE TO THREE TIMES PER WEEK, FOUR TO SIX TIMES PER WEEK OR EVERY NIGHT?

None ☐
One to three times per week ☐
Four to six times per week ☐
Every night ☐
Don't know ☐
Refuse ☐

Have you taken any of the following medicines in the past month?

Non-prescription Pain Killers (e.g. Aspirin, Tylenol, Ibuprofen) ☐
Prescription Pain Killers (e.g. Tylenol #3, Percocet) ☐
Sleeping Pills (e.g. Halcion, Dalmane) ☐
Antidepressants (e.g. Elavil) ☐
Tranquilizers/Sedatives (e.g. Ativan, Valium) ☐
Alcohol ☐
Any other medication (specify) _____

THIS NEXT QUESTION IS ABOUT YOU:

In general, compared to other persons your age would you say your health is (READ):

Much better ☐
Better ☐
Same ☐
Worse ☐
Much worse ☐
Don't know ☐
Refuse ☐

THESE FEW FINAL QUESTIONS WILL GIVE US A BETTER PICTURE OF THE PEOPLE WHO TOOK PART IN THE STUDY.

(Document; do not read:)

Sex

Male ☐
Female ☐

What year were you born in?

Year of birth _____ Actual age _____
Don't know ☐
Refuse ☐

What is your current marital status?

Single ☐
Married ☐
Common-law ☐
Separated ☐
Divorced ☐
Widowed ☐
Don't know ☐
No response ☐
Other (Specify) _____

Are you presently:

working full-time ☐
working part-time ☐
going to school ☐
unemployed ☐
retired ☐
keeping house ☐
unable to work ☐
don't know ☐
refused ☐

What is the highest level of education that you completed?

No Schooling ☐

Elementary
- Incomplete ☐
- Complete ☐

Junior High
- Incomplete ☐
- Complete ☐

High School
- Incomplete ☐
- Complete ☐

Non-University (Vocational/Technical/Nursing)
- Incomplete ☐
- Complete ☐

University
- Incomplete ☐
- Diploma/Certificate ☐
- Bachelor's Degree ☐
- Professional Degree ☐
- Master's Degree ☐
- Doctorate ☐

Don't know ☐
Refused ☐

If married/common-law:

What was the joint income for this past year before taxes and deductions?

If single/separated/divorced/widowed:

What was your income for this past year before taxes and deductions?

Read responses:

Under $6,000 ☐	34,000-37,999 ☐
6000-9,999 ☐	38,000-44,999 ☐
10,000-13,999 ☐	45,000-48,999 ☐
14,000-17,999 ☐	49,000-52,999 ☐
18,000-21,999 ☐	53,000-56,999 ☐
22,000-25,999 ☐	57,000-60,999 ☐
26,000-29,999 ☐	61,000-64,999 ☐
30,000-33,999 ☐	>65,000 ☐

Actual _____
Not sure ☐
No response ☐

Thank you very much for your time.

Appendix D

Chronic Pain: A Review of the Literature

E.M. Birse

Pain is one of the most common and potentially disruptive experiences in an individual's life. When pain is not relieved it affects all of a person's life, exacting a high price from the sufferer, the family, care givers and society in general. The assessment and management of chronic pain remains a complex and often frustrating process. Despite increases in knowledge about pain physiology and treatment, large numbers of people with chronic pain are not treated effectively and become increasingly dysfunctional (Baszanger, 1989; Burckhardt, 1990; McCaffery & Beebe, 1989).

An overview of the literature of selected topics related to adults' chronic pain is the intent of this paper. The major pain theories, definitions and issues in the epidemiology of chronic pain will be presented. Assessment, measurement and treatment of chronic pain will be reviewed. In addition an overview of the issues of individual coping and the role of the family in chronic pain will be presented.

Major Pain Theories

Theories of pain have been divided into the traditional (Affect, Specificity and Pattern) and the contemporary (Gate Control). The Gate Control Theory, which evolved from these traditional theories is the contemporary theory. Strategies for pain management have developed from some of these theories.

Affect Theory

The foundation for affect theory was Aristotle's belief that pain was not a sensation but an emotion. It was the opposite of pleasure (Melzack & Wall,1988). However, there was no explanation of why pain was an emotion or of a proposed pain mechanism (Kim,1980). The strength of the affect theory was its contribution to the identification of the affective or emotional dimension of pain which became overshadowed by developments in physiology. It was, however, not a comprehensive theory in its explanation of pain and it was in direct opposition to the specificity theory (Melzack & Wall, 1988).

Specificity Theory

The specificity theory, derived from the works of Descartes, Müller and Von Frey, proposed that there was a direct link between sensory organs and the brain. It stated that a highly specific pain system carried information from pain receptors in the skin to the brain. The pain receptors which generated pain impulses were thought to be free nerve endings in the skin (Melzack & Wall, 1988). Pain impulses were then carried by peripheral nerve fibres to synapse at the substantia gelatinosa in the dorsal horns of the spinal column, crossing over to the lateral spinothalamic tract, and ascending to a specific pain centre located in the thalamus (Melzack & Wall, 1988; Turk, Meichenbaum & Genest, 1983). From this theory, it was proposed that the management of pain consisted of removing the noxious stimuli or blocking the pathway between the periphery and the brain.

The major limitation of this theory was the lack of support from physiological and psychological evidence. Research into the physiological mechanisms of pain did not support a direct communication between the periphery and the brain. The single pathway system presupposes that stimulation of specific receptors must always and only elicit pain, that variations in the perception of a stimulus must occur at the receptor level and that the psychological experience of pain bears a direct relationship to a specific stimulus (Melzack & Wall, 1988). The specificity theory was not supported by clinical evidence based on pain syndromes such as phantom limb, where removing the noxious stimulus should result in the absence of pain. Pain management techniques such as nerve blocks, cordotomies, and rhizotomies which are based in the specificity theory failed clinically to produce pain relief or produced only short-term

results (Turk, Meichenbaum & Genest,1983). In addition, the theory did not consider that the quality and intensity of pain was influenced by a number of psychological and environmental factors (Craig, 1989; Baszanger, 1989; Hilbert, 1984; Kotarba,1983).

Pattern Theory

Pattern theory was developed as a reaction to the specificity theory assumption that stimulation of one type of receptor or nerve pathway produces a single psychological experience (Melzack & Wall, 1988). Pattern theory is an umbrella term for a number of theories (summation or intensive theory). Pattern theory proposes that pain is elicited by spatial and temporal patterns of nerve impulses produced when sensory impulses are summated at the dorsal horn cells, then transmitted by large fibres of the dorsal column pathways to the brain (Kim,1980). Goldscheider, in 1894 (cited in Melzack & Wall, 1988) proposed that the critical determinants of pain are the intensity of the stimulus and summation of impulses within the central nervous system.

Sinclair and Weddell dealt primarily with peripheral rather than central patterning. Excessive peripheral stimulation of nonspecific receptors produces a pattern of nerve impulses which is interpreted centrally as pain. This conceptualization was refuted as evidence supporting the physiological specialization of receptor fibres grew (Bonica, 1990a).

Central summation, as proposed by Livingston (cited in Melzack & Wall, 1988), was a mechanism by which noxious peripheral stimulation enlists abnormal circuits within the spinal cord that are interpreted by the brain as pain. These

reverberating circuits are potentially self-sustaining, possess the ability to be triggered by non-noxious stimuli and persist after the peripheral stimulus has been removed (Melzack & Wall, 1988). Central summation theory provided a good explanation for phantom limb pain. There is, however, no evidence for reverberatory circuits (Melzack & Wall, 1988).

Noordenboos (cited in Bonica, 1990a) proposed a sensory interaction system where the small, slow conducting fibres transmit pain and rapidly conducting large fibres inhibit transmission and prevent summation from occurring. If more small than large fibres are stimulated, there is increased transmission, summation and perception of pain (Wolff, 1980). It was conceptualized that the spinal cord was a short-axon multi-synaptic afferent system where impulses could enter the ascending sensory system at any point, be conducted to the brain and interpreted as pain. This conceptualization offered an explanation of why surgical lesions of the central and peripheral nervous system (for example, cordotomies) often fail to abolish pain (Melzack & Wall, 1988). The pattern theory posited that all nerve endings were similar in structure and transmission. This has not been supported (Bonica, 1990a). It also failed to describe a psychological foundation for the modulation of pain. Although the theory contributes to the understanding of delays, temporal and spatial summation of pathological pain, it did not provide for new direction in pain management.

Gate-Control Theory

The Gate-Control Theory, proposed by Melzack & Wall (1965), is an effort

to integrate physiological, psychological and clinical knowledge about pain. Melzack and Wall proposed that the human body had a gate-control system, a central control trigger and an action system. The transmission of nerve impulses from peripheral receptors was proposed to be increased or decreased through a neural mechanism or "gate" in the dorsal horns of the spinal cord. The gate or substantia gelatinosa, is capable of modifying sensory input before pain perception and response are elicited in the central nervous system. The degree to which the gate enhances or diminishes the flow of sensory input, is determined by the relative activity in the small and large diameter fibres as well as descending influences from the brain. Activation of large diameter fibres (A-beta) results in gate closure while activation of the small A-delta and C-delta fibres generally opens it, facilitating transmission of pain stimuli to the brain.

As stated earlier, Melzack and Wall, proposed the existence of a Central Control Trigger which consists of a special system of large diameter fibres which is activated by afferent stimulation. This trigger was proposed to activate cognitive and motivational processes in the brain which exerted control over sensory input by influencing the output from the dorsal horn T cells. As a result stimuli could be changed before being perceived.

When the stimuli passing through the gate exceeds a critical level, neural areas known as the Action System are triggered and pain is perceived and responded to. As the organism is in continuous interaction with its environment, painful stimuli are received by an active nervous system and may be influenced by events that preceded

the stimulus as well as concurrent activity. Interactions between the gate control system, the action system and the influences of cognitive activities on sensory input, may occur at any level of the central nervous system. The entire process was thought to be dynamic, incorporating the influences of complex ascending and descending systems (Melzack & Wall, 1988).

Melzack & Casey (1966) in a further development of the theory proposed that there were three dimensions to the psychological influences on pain. These were classified into the sensory-discriminative, motivational-affective and cognitive-evaluative dimensions. The sensory-discriminative dimension included the location, intensity and duration of the pain. The motivational-affective dimensions included the perception and appraisal of the meanings related to the sensation of pain. The cognitive-evaluative dimension is based on an individual's past experience and desire and expectations to avoid the painful stimuli (Bonica, 1990a). It exerts control over the other two dimensions. It is the interactions of these ascending and descending pathways which determine the individual response to a given painful stimulus. The gate-control theory incorporates psychological dimensions that provides evidence of the psychological factors influence on the pain stimulus before it is perceived.

Gate Control Theory and Chronic Pain

After lesions of the peripheral or central nervous system, prolonged bursting activity occurs which can be modulated by somatic, visceral and autonomic inputs as well as by inputs from emotional and personality mechanisms by means of the activation of descending inhibitory input. Memories of previous pain experiences at

spinal or supraspinal levels can also trigger abnormal firing patterns producing pain long after the initial lesions have healed (Katz & Melzack, 1991; Melzack & Dennis, 1978).

Criticisms of the Theory

The laminae of the dorsal horns have been identified as the substantia gelatinosa, and these laminae receive peripheral afferents and contain pain related substances. However, the basic mechanism of inhibition of painful stimuli has not been proven. Furthermore, the action by which the gate mechanism functions remains unknown (Kim, 1980; Nathan, 1976; Turk et al., 1983).

It has been identified that at least three descending brainstem systems terminate in the laminae of dorsal horns. The weakest element of the theory is the psychological component. These variables are difficult to identify and their exact mode of operation is unknown. Despite these gaps in knowledge, the theory provides a more comprehensive understanding about the pain mechanism than any traditional pain theories and has been responsible for generating research and clinical approaches to pain management.

Chronic Pain Definitions

Difficulties with the assessment and treatment of chronic pain results in part from the difficulties in defining and describing the phenomenon of chronic pain. There has been no agreement on what chronic pain is and how it should be measured and classified in clinical practice and epidemiologic research (Von Korff, Dworkin & Le Resche, 1990).

Pain has been defined broadly as an "unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (Merskey, 1986, p. S217)". Melzack (1986) has further defined chronic pain as "pain that may begin as acute pain but which continues long after the injury had healed or the insult has been removed". The International Association for the Study of Pain has expanded this definition to "pain that persists past the normal time of healing...we have taken 3 months as the most convenient point of division between acute and chronic pain (Merskey, 1986, p. S5)". The concept of normal healing is difficult to apply to many conditions associated with chronic pain such as arthritis or headaches (Von Korff et al., 1990). Furthermore, defining the point of division, temporally, is arbitrary (Bonica, 1990b). Bonica suggests that the definition of chronic pain include recurrence at intervals for months or years. This definition does not differentiate between the groups of individuals who remain functional and those whose pain poses significant disability and suffering. Loeser and Egan (1989) suggest chronic pain is that which interferes in significant ways with the individual's functioning. Chronic pain can then be defined as any pain, regardless of origin, that recurs or persists over an extended period of time and interferes with functioning (Burckhardt, 1990). The sequelae of chronic pain are detrimental, physically and psychologically destructive of the well-being of the individual and family, and without any biologic value (Bonica, 1990b).

The literature on chronic pain identifies a chronic pain syndrome exhibited by a sub-group of individuals with chronic pain. Chronic pain syndromes have been

identified from a biopsychosocial perspective and as a diagnostic taxonomy. The diagnostic taxonomy classifies chronic pain by specific pathological processes, body area or psychological origin (Merskey, 1986). The biopsychosocial perspective identifies a chronic pain syndrome which encompasses multiple dimensions of dysfunctional behaviours. These include depression, impairment of interpersonal relationships, psychological distress, demoralization, excessive use of health care and pain medications, significant activity limitations and adoption of the sick role (Fordyce, 1986; Fuerestein, 1989; Sternbach, 1985). However, others consider that chronic pain does not represent a clearly defined constellation of symptoms and signs that can be appropriately called a clinical syndrome or diagnosis (Osterweis, Kleinman & Mechanic, 1987 cited in Von Korff et al., 1990). The prevalence of a chronic pain syndrome is unknown as data on patients meeting the criteria has been collected from pain clinics and may not be representative of chronic pain patients in the general population (Turk & Rudy, 1990).

Prevalence of Chronic Pain and Health Care Utilization

The complaint of pain is one of the most common reasons for seeking health care (Selbst & Clark, 1990). There are, however, no accurate statistics on the prevalence of pain in the general population (Crook, Rideout & Browne, 1984). Epidemiological surveys of particular pain complaints have been carried out by diagnosis (Kellgren, Lawrence, & Aiken-Swan, 1953), by body area affected (Nagi, Riley & Newby, 1973) and by presenting symptoms to health care providers (Bain & Spaulding, 1967; Donovan, Dillon & McGuire, 1987; Shekelle & Brook, 1991; Von

Korff, Wagner, Dworkin & Saunders, 1991). This data has been supplemented by measures such as disability claims (Spitzer,1986) and loss of time from work due to pain (Bonica, 1977).

Epidemiological surveys of particular pain complaints have been carried out in the general population (Sternbach, 1986). There have been fewer surveys investigating the prevalence of chronic or persistent pain of all types in the general population. Many of the surveys that have been conducted have been limited by non-random sampling, type of data collected (James, Large, Bushnell & Wells, 1991; Roy & Thomas, 1987) and differences in the definition of persistent or chronic pain, resulting in a range of prevalence rates for chronic or persistent pain have ranged from 11% to 70% (Andersen & Worm-Pedersen, 1987; Brattberg, Thorslund & Wikman, 1989; Crook et al., 1984; Von Korff et al., 1990). There is a dearth of information about the prevalence and responses to pain in older adults (Brody & Kleban, 1983; Butler & Gastel, 1980; Harkins, 1988; Herr & Mobily, 1991).

Although many complaints of pain do not reach the health care system, significant numbers of individuals with pain access the health care system or are taking medication for complaints of pain. Little is known about the patterns of utilization of health care among chronic pain patients other than they seek care from multiple sources. There is some evidence that those with severe, persistent disabling pain use health care services at a greater rate than those with non-disabling pain of the same severity (Crook et al., 1984; Gjorup, Hendriksen, Lund & Stromgard, 1987; Sternbach, 1986; Von Korff, Wagner, Dworkin & Saunders, 1991).

Assessment and Measurement of Chronic Pain

Measurement of the perception of pain is divided into three aspects - behavioural, physiological and subjective reports of pain and related measures of psychological distress.

Behavioural measures include observations of verbal and non-verbal behaviour such as motor activity and bodily expressions of pain. Protocols have been developed for a variety of diagnostic categories including back pain and rheumatoid arthritis (Bradley, Anderson, Young & Williams, 1989; Keefe & Block, 1982). Behavioural measures can be limited by unclear reliability and validity and may reflect the systematic bias of the observer (Chapman et al., 1985; McGuire, 1988; Reading, 1989). Health care professionals' observations and assessments of patients' pain is often inaccurate and reflect the observers' biases and inferences (Camp & O'Sullivan, 1987; Krokosky & Reardon, 1990).

Physiological measures of chronic pain represent an attempt to find objective evidence of the experience of pain. However, no demonstration of a specific physiologic response that covaries reliably with reports of pain or is free from the effects of extraneous variables is available. Measures such as electromyographic activity and myofascial trigger point sensitivity have shown equivocal evidence in chronic pain patients (Bradley, Anderson, Young & Williams, 1989; McGuire, 1988; Reading, 1989).

Due to the unreliability of both behavioural and physiological measures, subjective reports of pain are the most commonly used measures of chronic pain.

These are generally divided into categorical and rating scales. Although subjective reports may be affected by response biases, reinforcement contingencies and affective disorders, they remain the most reliable and valid measures of a subjective and individual experience of pain (Chapman et al., 1985; McGuire, 1988; Reading, 1989).

There are a number of categorical scales which seek to measure various aspects of the chronic pain experience. The McGill Pain Questionnaire (MPQ) is one of the most widely recognized instruments for measuring the multidimensional nature of pain (Melzack, 1975b). Based on a framework which conceptualizes pain as having sensory, affective and evaluative properties, clients choose words that describe their current pain. The MPQ has demonstrated good properties of reliability and validity (McGuire, 1988) and is sensitive to treatment effects. However, the MPQ requires concentration from respondents and is lengthy to administer. Some of the word descriptors may be difficult to understand and are forced choices (Burckhardt, 1990; Chapman et al., 1985). The tool is weighted towards measuring the sensory dimension of pain and an alternative scoring system has been suggested to minimize this bias (Deschamps, Band & Coldman, 1988).

There are a number of other categorical scales that have demonstrated varying degrees of reliability and validity (Davis, 1989; Kerns, Turk & Rudy, 1985; Watt-Watson & Graydon, 1989). However, these tools need to be evaluated in a variety of patient populations (McGuire, 1988).

Visual analogue pain scales (VAS) are simple, reliable and sensitive scales

which generally measure the variable of pain intensity (Chapman et al., 1985; Lee & Kieckhefer, 1989; Scott & Huskisson, 1976; Wewers & Lowe, 1990). However, by modifying the anchor labels on the scale, different dimensions of the pain experience can be quantified (McCormack, de L. Horne & Sheather, 1988).

Measures of Psychological Distress

Anxiety and depression are psychological variables which appear to be related to the perception and experience of chronic pain (Ward, 1990). Chronic pain can be associated with severe depression as patients lose hope for relief and realize that the pain and disability may persist indefinitely.

It is difficult, however, to determine if anxiety and depression are factors which influence the perception of pain or are the consequences of pain (Craig, 1989; Gamsa & Vikis-Freibergs, 1991; Tauschke, Merskey & Helmes, 1990; Ward, 1990). Estimates of prevalence of depression and anxiety vary and research on the relationship between pain and these variables are limited by methodological weaknesses in the measures of pain, depression and anxiety. Common assessment tools such as the Beck Depression Inventory emphasize the somatic symptoms of depression (sleep disturbances, weight changes, for example). The symptoms of depression overlap with those of a variety of chronic illnesses and pain. A tool such as The Center for Epidemiologic Studies Depression (CESD) Scale is valuable for assessing patients for whom this confound may exist (Devins & Orme, 1985). Furthermore, there are variations in the populations studied and there are no accurate assessments of base rates of depression and anxiety in the general population (Craig,

1989; Gupta, 1986). Despite these limitations, studies show prevalence rates of depression in chronic pain patients ranging from 30% to 100% (Romano & Turner, 1985).

Chronic Pain and The Family

Researchers and clinicians in chronic pain have speculated about the role of the family in the etiology and maintenance of chronic pain in individuals within the family. Other areas of interest include the role of the family in the treatment of chronic pain and the effect of chronic pain on individuals other than the patient.

Research on the etiological role of the family in producing chronic pain is inconclusive. Variables that have been examined include, but are not limited to, the size of family, quality of relationship with parents, early loss of a family member, incidence of pain or illness in the family, corresponding location of pain or depression in a family member (Payne & Norfleet, 1986). There is some evidence that pain patients have a higher incidence of family members with pain (Ehde, Holm & Metzger, 1991; Violin, 1983; Violin & Giurgea,1984). The presence of depression in a family member has been correlated with the development of chronic pain suggesting there are psychological factors contributing to the development of chronic pain (Krishnan, France & Houpt, 1985). Other factors have shown to be generally inconclusive. Limitations of research in this area include the unknown rates of chronic pain symptoms in the general population, lack of control groups, reliance on retrospective reports, use of non-standardized assessment instruments and the use of cross-sectional designs (Turk, Flor & Rudy, 1987).

Descriptions of the interpersonal characteristics of the family have generated hypotheses about how the family's interactions may contribute to the maintenance of a pain problem. These hypotheses are based on theoretical models such as psychodynamics, family systems theory, early learning and modeling (Edwards, Zeichner, Kuczmiercyk & Boczkowski, 1985; Turk et al., 1987). There is little empirical data to suggest that the family serves to maintain chronic pain behaviours or pain is used to control family members (Turk et al., 1987). Most studies focus on the spouse and exclude other family members (Mikail & von Baeyer, 1990; Turk et al., 1987). There is evidence that chronic pain patients and their families show considerable distress and marital dissatisfaction (Lennon, Link, Marbach & Dohrenwend, 1989; Maruta, Osborne, Swanson & Halling, 1981). Furthermore, there appears to be a positive relationship between pain levels and conflict in the family. There is little research which examines the processes that may translate a family problem into a physical problem. It is possible that the characteristics of family patterns thought to perpetuate pain, are not the causative factors but the consequences of a family member having pain (Payne & Norfleet,1986).

Theoretically, chronic illness including chronic pain has the potential to alter family roles, cause financial difficulties and create distress within the family. Chronic illness may be seen as a crisis for the family. A crisis, however, can be either a threat or a challenge. How the family perceives the crisis depends upon contextual factors. Little attention has been given to understanding factors that contribute to adaptive coping rather than examining maladaptive or dysfunctional patterns of coping (Turk et

al., 1987).

There is evidence that spouses and children of pain patients experience health disturbances (emotional, physical or social) which they attribute to the pain in their spouse or parent (Flor, Turk & Scholz, 1988; Mikail & von Baeyer, 1990; Rowat and Knafl, 1985). Limitations of many of these studies are that they examine spouses of patients in pain centres and are not compared to spouses of patients with other chronic illnesses or matched controls in the general population. These patients are not a representative sample of patients with chronic pain and represent those who are coping least well (Turk & Rudy, 1989).

Coping Strategies

When pain is chronic, patients typically develop a repertoire of cognitive and behavioural strategies to cope with pain (Crook, Tunks, Kalaher & Roberts, 1988). Our understanding of how individuals choose and use these strategies is limited. Studies in this area are recent and many aspects of the pain coping process are not yet fully understood (Fernandez & Turk, 1989). Standardized questionnaires can be used to assess cognitive strategies (for example, ignoring pain) and behavioural strategies (changing activity levels) that patients use to deal with chronic pain. There is evidence that pain coping strategies are much stronger predictors of pain and disability in low back pain (Rosenstiel & Keefe, 1983; Turner & Clancy, 1986), arthritis (Beckham et al., 1991; Keefe et al., 1987) and sickle cell disease patients (Gil, Abrams, Phillips & Keefe, 1989) than medical status variables. Patients who report more reliance upon medical professionals are likely to have adopted fewer cognitive and potentially

adaptive coping strategies than patients who view only themselves as responsible for their health status (Buckelew et al., 1990). More research is needed to determine the influence of self-efficacy in the perception and management of chronic pain (Skevington, 1983).

Keefe and Williams (1990) found little difference in choice of strategy or the perceived effectiveness of the strategy based on age. Older patients tended to use praying as a strategy compared to younger patients. The choice of coping strategy was correlated with the intensity of pain. Those with higher pain levels tended to use diversion and increasing activity while those with lower levels used coping self-statements.

Most studies in this area have used cross-sectional designs rather than a longitudinal design. It is difficult to determine whether pain coping strategies determine pain and psychological distress or whether pain and distress determine the choice of coping strategies. Longitudinal designs could determine how coping strategies change over the course of a particular individual's life span and how variables such as personality and support influence the choice of strategy and its perceived effectiveness (Beckham et al., 1991; Keefe & Williams, 1990).

Pain Management Interventions

Most strategies that have been advocated for managing chronic pain can be placed within two broad categories: physiologic and cognitive-behavioural (Burckhardt, 1990). The basis upon which these strategies control pain is: 1) stimulation of the large A-beta fibres producing gate closure, 2) decreasing or

interrupting activation of the small A-delta and C-delta fibres and 3) influencing sensory input by influencing the central control trigger on the descending cognitive and motivational processes (Melzack & Wall, 1988).

Methods of pain management which close the gate by stimulating the large A-beta fibres are referred to as hyperstimulation analgesia or counterirritation (Melzack & Wall, 1988). Acupuncture, transcutaneous electrical nerve stimulation, cutaneous stimulation and the application of heat and cold are methods of hyperstimulation analgesia.

Acupuncture, which involves the insertion of fine needles at specific points through the skin and moving the needles or applying an electrical charge to the needles has been shown to produce analgesia of varying degrees Richardson & Vincent, 1986). Pain relief was believed to be the result of stimulation of the large A-beta fibres (Melzack, 1973) but this has come in to question (Nathan & Rudge, 1974). Melzack (1973; 1975a) has subsequently postulated the existence of a central biasing mechanism at higher levels in the central nervous system that inhibits noxious stimulation when activated by intense somatic stimulation. Richardson and Vincent (1986), after conducting an exhaustive review of the literature, suggest that although there have been few satisfactory double-blind trials, patients with chronic low back pain will derive clinically significant short-term benefits from acupuncture with highly variable response rates ranging from 26% to 79%.

Transcutaneous electrical nerve stimulation (TENS) is a method of applying controlled, low-voltage electricity to the body via electrodes placed on the skin to

selectively activate the large diameter afferent or efferent (motor) fibres depending on the mode selected. There is some evidence that TENS may stimulate the release of endorphins and other neurotransmitters which may account for the long-lasting effects of certain modes (Bonica, 1990c; Melzack & Wall, 1988). TENS has been found to be useful in reducing chronic pain due to a variety of etiologies (Eland, 1990; Fried, Johnson, & McCracken, 1984; Graff-Radford, Reeves, Baker & Chiu, 1989; Mannheimer & Lampe, 1984; Ottoson & Lundeberg, 1988; Woolf, 1989). The effects, however, are variable in length and degree (Deyo, Walsh, Martin, Schoenfeld & Ramamurthy, 1990). Chronic pain states that are widespread and poorly localized are generally not suitable for treatment by TENS (Nielzen, Sjolund & Eriksson, 1982). Major weaknesses of many earlier studies were lack of randomization, poor controls, inadequate blinding and small samples (Nolan, 1988). Further controlled research is needed to determine its efficacy in a variety of pain producing conditions.

Similarily, hyperstimulation analgesia techniques including the application of heat, cold and vibration have been shown to be useful to produce pain relief in a number of chronic pain patients (Lehrman & de Lateur, 1989; Lundeberg, Nordemar & Ottoson, 1984; Melzack, Jeans, Stratford & Monks, 1980). Research into these techniques has been limited but should be pursued as the techniques can be used by individuals in a variety of settings as adjuncts to other therapies.

Physical conditioning is among the least well-studied physiologic strategies for the control of chronic pain. The effects on pain are equivocal and more research is needed (Burckhardt, 1990; Jackson & Brown, 1983).

Based on the Gate-Control theory, analgesia is an intervention thought to inhibit small fibres thereby closing the gate. The use of analgesics is a major component of the treatment of acute pain and controversial in chronic pain. A strategy of many comprehensive pain management programs is to minimize or completely eliminate the use of narcotic analgesics in the belief that these medications contribute to the chronic pain problem (Simon, 1989). Data from these pain clinics present an unfavourable view of opioid use, correlating its use with poorer outcomes and greater physical and psychosocial impairment (Halpern & Robinson, 1985; Portenoy, 1990). There is a lack of research to support the belief that medications contribute to dysfunction in patients with chronic pain. These data may be compromised by selection bias as those attending pain clinics are not typical of people in the general population who suffer chronic pain and are not referred to these clinics. Pain clinic patients show greater impairment in functioning and psychosocial difficulties (Crook & Tunks, 1985; Turk & Rudy, 1990). Patients who have not benefited from other attempts to relieve pain may benefit from chronic opioid therapy if they achieve increased comfort and improved function. In patients with chronic non-malignant pain, contrary to widespread beliefs of health care professionals, long-term use is not associated with a significant risk of psychological dependence (Taub, 1982; Portenoy & Foley, 1986).

Other medications used in the treatment of chronic pain include non-steroidal analgesics, acetaminophen, benzodiazepines, anticonvulsants and antidepressants. There is strong evidence of the efficacy of antidepressants in decreasing pain in a

variety of pain syndromes and they have been postulated to possess analgesic effects in addition to antidepressant effects (Butler & Murphy, 1989).

The second means of controlling pain is to interrupt or decrease activation of the small A-delta and C-delta fibres. The injection of local anaesthetic agents for local and regional blocks acts to interrupt the nociceptive input at its source or block nociceptive fibres. Low concentrations of local anaesthetics block the A-delta and C-delta fibres, diminishing the total sensory input to the spinal transmission cells (Bonica, 1990c). Melzack & Wall (1988) suggest that anaesthetic blocks could eliminate self-sustaining memory-like activity, producing longer periods of relief. In addition, relief of the pain would increase the individual's activity, activating large diameter A-beta fibres and further closing the gate.

In addition to the previously described interventions, psychological approaches are an important part of the management of chronic pain. Psychological approaches influence the central control trigger and result in modulation of the sensory input of the painful stimulus. Successful pain control involves changing the cognitive-motivational components while the sensory component remains intact (Weisenberg, 1989).

Cognitive-behavioural approaches are based on the theory that patients perceptions of pain interact reciprocally with emotional factors, sensory phenomena and behavioural responses (Turk & Rudy, 1989). Individuals are taught coping strategies and to change their thoughts and behaviours, so that they can assume control over their own pain (Turk et al., 1983; Weisenberg, 1989). Interventions

include strategies such as relaxation, imagery, distraction, cognitive restructuring, biofeedback, hypnosis and operant conditioning. Studies of patients using cognitive-behavioural strategies showed positive, short-term effects. Mood and number of subjective symptoms show greater changes than pain intensity, duration and frequency. A major benefit appears to be the reduction of fear and depression that can accompany chronic pain (Fernandez & Turk, 1989; Hyman, Feldman & Harris, 1989; Malone & Strube, 1988).

Operant conditioning or contingency management is based on learning theory where treatment focuses on decreasing learned pain behaviours and increasing behaviours inconsistent with the sick role. Behaviours to be increased and decreased are defined and reinforcers are identified and manipulated so that rewards are contingent on the performance of desired behaviours. Pain behaviours are not rewarded (Fordyce et al., 1973; Turner & Romano, 1984). A major problem for operant approaches is that the desired behaviour often fails to be maintained once the external reinforcement is withdrawn (Turk & Rudy, 1989).

It is not clearly understood how and why many pain management strategies work. Cognitive-behavioural strategies to be successful must fit the context, be accepted by the involved patient, who in turn must have a sense of self-efficacy or belief that they can control their pain (Weisenberg, 1989). Research is needed to determine which approaches work best for particular patient populations. A problem in assessing cognitive-behavioural approaches is that control subjects use their own coping strategies spontaneously making it difficult to measure treatment effects.

Outcome studies tend to be brief in duration and use inconsistent criteria for evaluation of success. In addition, the characteristics of patients who do not use these strategies or fail to complete programs is poorly documented (Turk & Rudy, 1990; Weisenberg, 1989).

Conclusion

Many advances in the management of chronic pain have occurred, impelled by an increased understanding of the physiology of pain, recognition of the need for a multidisciplinary approach and the development of systematic methods of assessing, classifying and treating pain. Nevertheless, barriers to adequate chronic pain management continue to exist. There is a need to integrate the current knowledge about pain in order to effect improvements in nursing care. In addition, there are gaps in our basic knowledge about the prevalence, definition, assessment and treatment of chronic pain. The identification of this information would provide guidelines for nursing practice, research and education on the complex problem of chronic pain.

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